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ASTOUNDING

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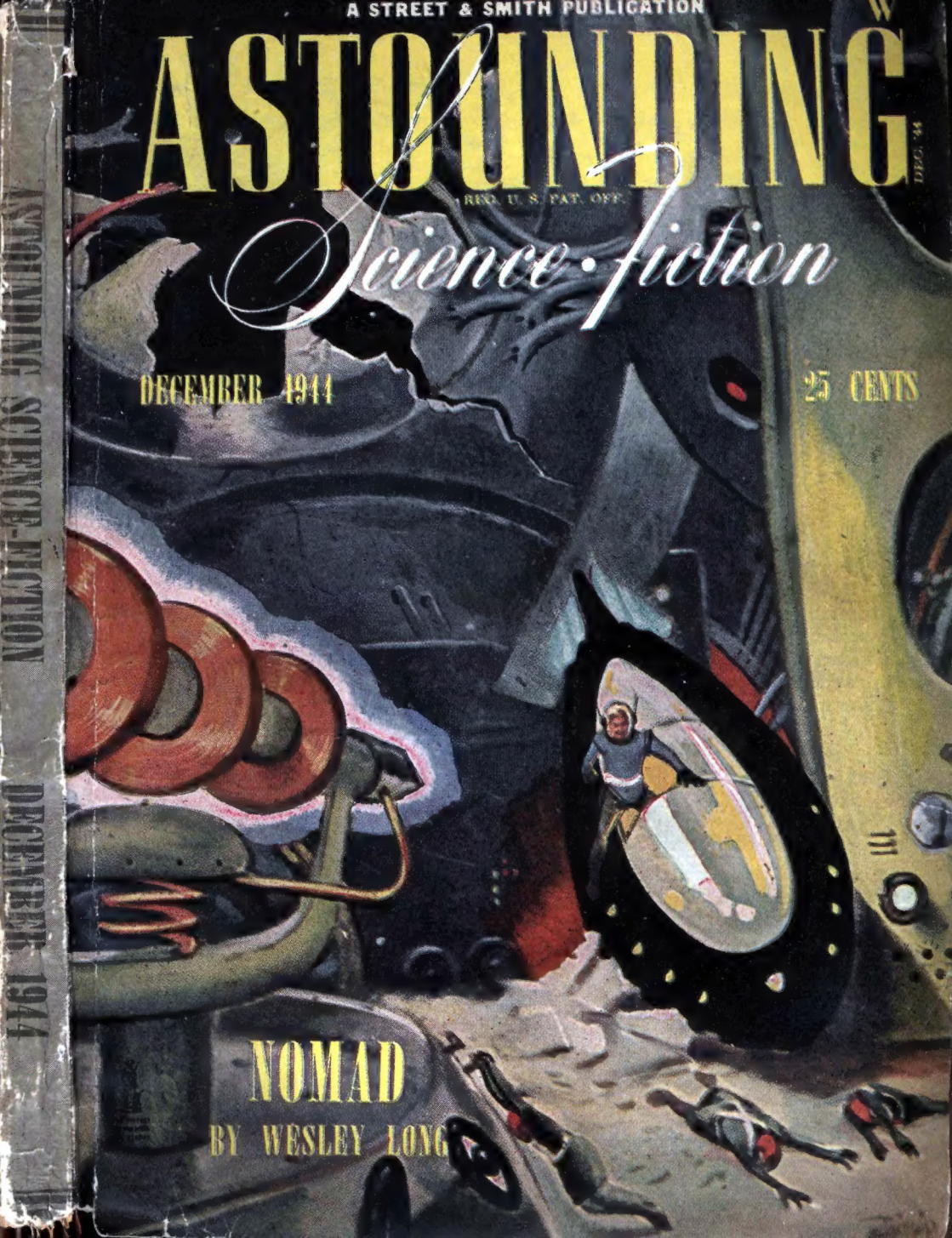
Science-fiction

DECEMBER 1944

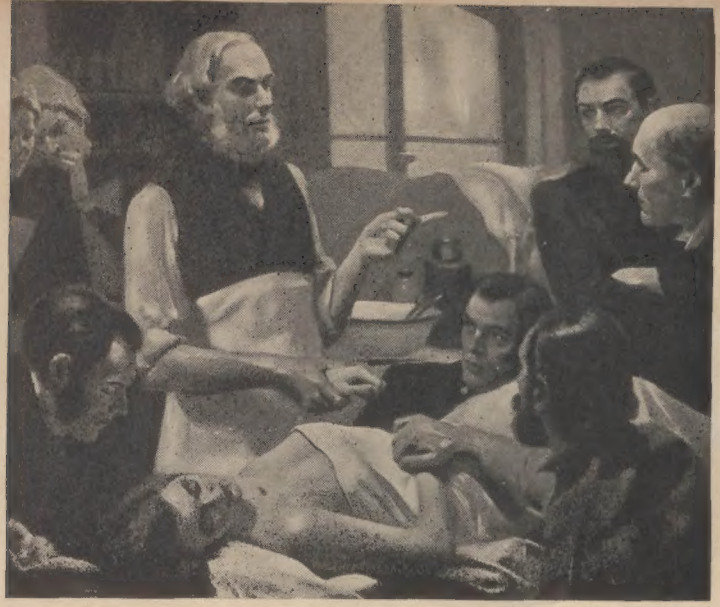
25 CENTS



NOMAD

BY WESLEY LONG

ASTOUNDING SCIENCE-FICTION DECEMBER 1944



"Scoff, if you will, Gentlemen, but this woman will live!"

SLOWLY, and with the fierce conviction and undying faith that had marked him from the beginning, Lister, his scalpel laid aside, the last dressing completed, addressed his critical audience.

In the eyes of one or two he saw hope and faith to buttress his own, but on the faces of others—some of them the leaders of the profession—he read only doubt and disbelief.

He could almost hear the sneers of the attending nurses whispering in the background while they viewed the pale and lovely woman on the table. Lister knew that they regarded his fanatical insistence on cleanliness, the repeated dressings, his evil antiseptics, as the vagaries of a madman . . . that they were awaiting the "dead-cart" to carry the woman away, just as it had carried away countless others, when blood poisoning followed compound fracture.

But Lister knew, also, that his radical methods, his antiseptics aimed to keep germs out of wounds, before, during and after every operation, must, with God's will, triumph.

And triumph they did . . . the woman lived!

So, patient by patient, case by case, day by day, Lister piled up evidence in support of his antiseptic theory which was to rid the world of untold suffering, and reduce the hideous fatalities that time and time again followed even the simplest surgical operations.

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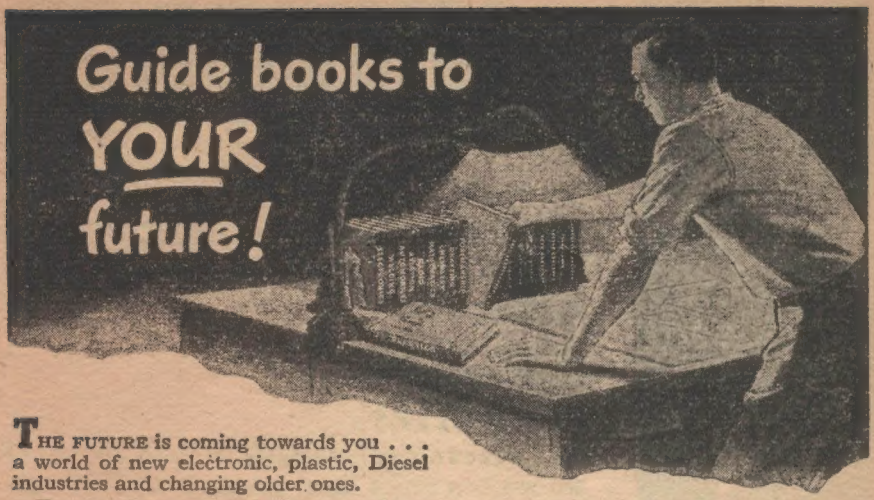

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Robots and Planes

The robot part of the robot bomb is, of course, a low-grade idiot among robots. Incidentally, it violates, seriatim, all three of Asimov's "Three Laws of Robotics"—it will injure humans; it destroys itself; and it is much too erratic to allow anyone to say honestly that it obeys orders given it.

Yet, curiously, the public in general is becoming aware of the fact that robots are not silly dreams of a fantastic future but, in this instance, horrible nightmares of right now, through the medium of this sub-idiotic contraption among robots. The Flying Fortress, even more the new Super Fortress, are robots—and infinitely more intelligent robots—which, it happens, normally carry pilots and crew with them. It has been proven time and again, however, that the Flying Fortress, or the Liberator—which, of course, carries the same type of robotic brain—can fly perfectly without any help from its human crew. Most of the time they do; during the most critical moment of the whole mission, the bombing run itself, they are under the control of the robot bombsight mechanism. The bombardier's job is to carefully point out to the robot "There—hit that one!" and the robot, not the bombardier, does the job.

There are lots of robots in every day use, however, which, because they don't have clanking arms and legs, nor tin-plate heads with painted eyes, aren't recognized as such. Everything from telephone switchboards—particularly the crossbar type—to differential integrators.

But the robot bomb, actually, is new only in minor degree—technologically, it is not an invention, but an improvement and adaptation. It's a Whitehead torpedo with modifications for air-borne use. As the Whitehead torpedo is a miniature submarine carrying a warhead, the robot bomb is a miniature plane similarly burdened. Both are gyro controlled. Both must, to be at all effective, attain speeds comparable to the highest speeds possible to other mechanisms operating in their respective media. Each, at its first introduction, has been enormously dangerous, requiring the development of new countermeasures.

The Nazi's torpedoes have been rendered harmless, incidentally, in

precisely the same way the robot bomb was stopped—by destroying or capturing the launching mechanisms. Nobody tried to destroy the torpedoes particularly—they went after the subs that launched them. The air torpedo is more vulnerable, and its launching platform considerably less so. However, the rocket bomb probably won't be a particularly dangerous weapon—nowhere near as dangerous, for instance, as a fighter-bomber. The robot's great trouble, whether piloting a bomb or in any other application, is that it can not correct its errors, handle emergencies, nor display inherent intelligence. (They can, and do, of course, display secondhand intelligence—the intelligence the designer built into them.) Essentially, that means simply that a robot can't duck. It can't, as a human pilot can, zig when it's expected to zag.

Characteristically, the most advanced types of robots include special devices that call for human help when something goes wrong—they don't yet think their own way out of emergencies.

So long as the robot bomb can't duck, a combination of improved antiaircraft fire control and special, super-speed fighters can take care of them. The standard fighter plane is designed to be able to maneuver, to be able to zig just as fast and just as tight as the zig of the enemy pilot, and to zag every time he does. You sacrifice a lot of speed that way—but you need it against a human pilot. You don't, with a robot pilot. And, since a human-piloted machine can be expected to return intact, a lot more expensive, more powerful, and better parts can be used in it.

The robot bomb idea, converted to peacetime use, would give us a completely robot air freight system. The present use of the flying robot simply allows it to crash-land—but the blind-landing systems developed before the war, to permit safe landing when fog closed in on the airports, nearly all depended on having the pilot bring the plane into the neighborhood of the field, where a radio signal picked up and started a robot-landing pilot. It was easier to design a robot to directly interpret and act on the radio signals than to design instruments for a pilot to read, convince him he could trust them, and train them to act on them. Simple enough to add that robot to the present systems.

And you know, they will almost certainly do that. Fog and weather won't hold terrors. Every plane will take off under robot control, fly under radio-robot control, and land under radio-robot control. Every plane on every commercial air line.

With two men to watch the robot. Men can replace a tube if it blows. They can make adequate adjustment for an engine that burns out. No robot yet devised can do all the things that might be needed in all the emergencies that could arise—and it will be a heck of a long time before they do contrive one that will do that, and still weigh less than one hundred fifty pounds, and cost less than ten thousand dollars a year for all maintenance.

THE EDITOR.

Nomad

by WESLEY LONG

***Part 1** of 3 parts. Long's first serial tells of a man harried from world to world, kidnaped, betrayed—for a purpose he never knew, but faithfully fulfilled!*

Illustrated by Orban

I.

Guy Maynard left the Bureau of Exploration Building at Sahara Base and walked right into trouble. It came more or less of a surprise; not the trouble as a condition but the manner and place of its coming was the shocking quality. Guy Maynard was used to trouble but like all men who hold commissions in the Terran Space Patrol, he was used to trouble in the proper places and in the proper doses.

But to find trouble in the middle of Sahara Base was definitely stunning. Sahara Base was as restricted an area as had ever been guarded and yet trouble had come for Guy.

The trouble was a MacMillan held in the clawlike hand of a Martian. The bad business end was dead-center for the pit of Guy's

stomach and the steadiness of the weapon's aim indicated that the Martian who held the opposite end of the ugly weapon knew his MacMillans.

Maynard's stomach crawled, not because of the aim on said midriff, but at the idea of a MacMillan being aimed at any portion of the anatomy. His mind raced through several possibilities as he recalled previous mental theories on what he would do if and when such a thing happened.

In his mind's eye, Guy Maynard had met MacMillan-holding Martians before and in that mental playlet, Guy had gone into swift action using his physical prowess to best the weapon-holding enemy. In all of his thoughts, Guy had succeeded in erasing the menace though at one time it ended in death to the enemy and at other times Guy had used the enemy's own weapon to march him swiftly to the Intelligence Bureau for questioning. The latter always resulted in the uncovering of some malignant plot for which Maynard received plaudits, decorations, and an increase in rank.

Now Guy Maynard was no youngster. He was twenty-four, and well educated. He had seen action before this and had come through the Martio-Terran incident unscathed. Openly he admitted that he had been lucky during those weeks of trouble but in his own mind, Maynard secretly believed that it was his ability and his brain that brought him through without a scratch.

His dreaming of action above and beyond the call of duty was normal for any young man of intelligence and imagination.

But as his mind raced on and on, it also came to the conclusion that the law of survival was higher than the desire to die for a theory.

Therefore it was with inward sickness that Guy Maynard stopped short on the sidewalk before the Bureau of Exploration Building and did nothing. He did not look around because the fact that this Martian was able to stand before him in Sahara Base with a MacMillan pointed at his stomach was evidence enough that they were alone on the street. Had anyone seen them, the Martian would have been literally torn to bits by the semi-permanent MacMillan mounts that lined the roof tops.

The Martian had everything his own way, and so Maynard waited. It was the Martian's move.

"Guy Maynard?"

Maynard did not feel that such an unnecessary question required an answer. The Martian would not have been menacing him if he hadn't known whom he wanted.

"Guy Maynard, I advise that you do nothing," said the Martian. His voice was flat and metallic like all Martian voices, and the sharply-chiseled features were expressionless as are all Martian faces. "You are to come with me," finished the Martian needlessly. He had not concluded the last bit of information when invisible tractor beams lashed down and caught the pair in

their field of focus and lifted them straight up.

The velocity was terrific, and the only thing that saved them suffocation in the extreme upper stratosphere was the entrapped air that went along with the field of focus.

The sky went dark and the stars winked in the same sky as the flaming sun.

And then they entered the space lock of an almost invisible spaceship. The door slammed behind them and air rushed into the confines of the lock just as the tractors were snuffed.

Maynard arose from the floor to face once more that rigidly held MacMillan. Before he could move, the door behind him flashed open and three Martians swarmed in upon him and trussed him with straps. They carried him to a small room and strapped him to a surgeon's table.

The one with the MacMillan holstered the weapon as the ship started off at 3-G.

"Now, Guy Maynard, we may talk."

Maynard glared.

"It is regrettable that this should be necessary," apologized the Martian. "I am Kregon. Your being restrained is but a physical necessity; I happen to know that you are the match for any two of us. Therefore we have strapped you down until we have had a chance to speak our mind. After which you may be freed—depending upon your reception of the proposition we have to offer."

Maynard merely waited. It was very unsatisfactory, this glaring, for the Martian went on as though Maynard were beaming in glee and anxiously awaiting for the "Proposition." He recalled training which indicated that the first thing to do when confronted by captors is to remain silent at all cost. To merely admit that your name was correctly expressed by the captor was to break the ice. Once the verbal ice was broken, the more leading information was easier to extract; a dead and stony silence was hard to break.

"Guy Maynard, we would like to know where the *Orionad* is," said Kregon. "We have here fifty thousand reasons why you should tell. Fifty thousand, silver-backed reasons, legal for trade in any part of the inhabited Solar System and possibly some not-inhabited places."

No answer.

"You know where the *Orionad* is," went on Kregon. "You are the aide to Space Marshal Greggor of the Bureau of Exploration who sent the *Orionad* off on her present mission. The orders were secret, that we know. We want to know those orders."

No answer.

"We of Mars feel that the *Orionad* may be operating against the best interests of Mars. Your continued silence is enhancing that belief. Could it be that we have captured the first prisoner in a new Terra-Martian fracas? Or if the *Orionad* is not operating against Mars, I can see no reason for continued silence on your part."

No answer, though Maynard knew that the *Orionad* was not menacing anything Martian. He realized the trap they were laying for him and since he could not avoid it, he walked into it.

Kregon paused. Then he started off on a new track. "You are probably immunized against iso-dinilamine. Most officials are, and their aides are also, especially the aide to such an important official as Space Marshal Greggor. That is too bad, Guy Maynard. Terra is still behind the times. Haven't they heard that the immunization given by anti-lamine is good except when anti-lamine is decomposed by a low voltage, low frequency electric current? They must know that," said Kregon with as close to a smile as any Martian could get. It was also cynically inclined. "After all, it was Dr. Frederich of the Terran Medical Corps who discovered it."

Maynard knew what was coming and he wanted desperately to squirm and wriggle enough to scratch his spine. The little beads of sweat that had come along his backbone at Kregon's cool explanation were beginning to itch. But he controlled the impulse.

"We are not given to torture," explained the Martian. "Otherwise we could devise something definitely tongue-loosening. For instance, we could have you observe some surgical experiments on—say —Laura Greggor."

The beads of sweat broke out over Maynard's face. It was a harsh thought and very close to home. And yet there was a separate section of his mind that told him that Laura would undergo that treatment without talking and that he would have to suffer mentally while he watched, because she would hold nothing but contempt for a man who would talk to save her from what she would go through herself. He wondered whether they had Laura Greggor already and were going to do as they said. That was a hard thing to reason out. He feared that he would speak freely to save Laura disfigurement and torture; knowing as he spoke that Laura would forever afterward hate him for being a weakling. Did they have her—?

"Unfortunately for us, we have not had the opportunity of getting the daughter of the Space Marshal. But there are other things. They are far superior, too. I was against the torture method just described because I know that Mars would never have peace again if we destroyed the daughter of Space Marshal Greggor. Your disappearance will be explained by evidence. A wrecked spaceship or flier, will take care of the question of Guy Maynard, whereas Laura Greggor is forbidden to travel in military vehicles."

Kregon turned and called through the open door. His confederates came with a portable cart upon which was an equipment case, complete with plug-in cords, electrodes, and controls.

"You will find that low frequency, low voltage electricity is very excruciating. It will not kill nor maim nor impair. But it will offer

you an insight on the torture of the damned. Ultimately, we will have decomposed the anti-lamine in your system and then you will speak freely under the influence of iso-dinilamine. Oh yes, Guy Maynard, we will give you respite. The current will be turned off periodically. Five minutes on and five minutes off. This is in order for you to rest."

"—*to rest!*" said Maynard's mind. Irony. For the mind would count the seconds during the five free minutes, awaiting with horror the next period of current. And during the five minutes of electrical horror, the mind would be counting the seconds that remain before the period of quiet, knowing that the peaceful period only preceded more torture.

Kregon's helpers tied electrodes to feet, hands, and the back of his head. Then Kregon approached with a syringe and with an apologetic gesture slid the needle into Maynard's arm and discharged the hypodermic.

"Now," he asked, "before we start this painful process, would you care to do this the easy way? After all, Maynard, we are going to have the answer anyway. For your own sake, why not give it without pain. That offer of fifty thousand solars will be withdrawn upon the instant that the switch is closed."

Maynard glared and broke his silence. "And have to go through it anyway? Just so that you will be certain that I'm not lying? No!"

Kregon shook his head. "That possibility hadn't really occurred to us. You aren't that kind of man, Maynard. I think that the best kind of individual is the man who knows when to tell a lie and when not to tell. Too bad that you will never have the opportunity of trying that philosophy, but I think it best for the individual, though often not best for society in general. Accept the apology of a warrior, Guy Maynard, that this is necessary, and try to understand that if the cases were reversed, you would be in my place and I in yours. I salute you and say good-by with regrets."

Maynard strained against the straps in futility. He felt that sense of failure overwhelm him again, and he fought against his fate in spite of the fact that there was nothing he could do about it. Another man would have resigned himself, realizing futility when it presented itself, and possibly would have made some sort of prayer. But Guy Maynard fought—

And the surge of low frequency, low voltage electricity raced into his body, removing everything but the torture of jerking muscle and the pain of twitching nerves. It was terrible torture. He felt that he could count each reversal of the low frequency, and yet he could do nothing of his own free will. The clock upon the wall danced before his jerking eyeballs so that he could not see the hands no matter how hard he tried. Ironically, it was a Martian clock and not calibrated into Terran time; it would have had no bearing on the five-minute periods of sheer hell.

Ben Williamson raced across the sand of Sahara Base, raising a curling cloud of dust behind him. The little command car rocketed and careened as Williamson approached his destroyer, and then the long, curling cloud of dust took on the appearance of a huge exclamation point as the brakes locked and the command car slid to a stop beside the space lock. Williamson leaped from the command car and inside with three long strides.

He caught the auxiliary switch on his way past, and the space lock whirred shut. "Executive to pilot," he yelled. "Take her up at six."

The floor surged, throwing Williamson to his knees. Defiantly, Ben crawled to the executive's chair and rolled into the padded, body-supporting seat. He lay there for some seconds, breathing heavily. Then from the communicator there came the query:

"Pilot to executive: Received. What's doing?"

"Executive to crew: Martian of the *Mardinex* class snatched Guy Maynard on a tractor. We're to pursue and destroy."

"Golly!" breathed the pilot. "Maynard!"

"That's right," said Williamson. "They grabbed him right in front of the BuEx and that's that."

"But to destroy them—?"

"We're running under TSI orders, you know," reminded Williamson.

"Yeah, I know. But killing off one of our own people doesn't sound good to me. Makes me feel like a murderer."

"I know," said Ben. "But remember, Maynard was grabbed by a Martian. Being an aide to Greggor, he was filled to the eyebrows with anti-lamine. That means the electro-treatment for him, plus a good shot of iso-dinilamine. All we're doing is giving peace to a man who is suffering the tortures of hell. After all, would any of you care to go on living after that combination was finished?"

"No, I guess not. Must be worse than death not to have a mind."

"What's worse is what happens. You haven't a mind—and yet you have enough mind to realize that fact. Strange psychological tangle, but there it is. Tough as it is, we've got to go through with it."

"They're after some information on the *Orionad?*"

"Probably. That's why we're taking out after them. It's the only reason why Guy Maynard was covered under the TSI order."

"Too bad," said the pilot.

"It is," agreed Williamson. "But—prepare for action. Check all ordnance."

It was almost an hour later that the communicator buzzed again. "Observer to executive: Martian of *Mardinex* class spotted."

"Certain identification?"

"Only from the cardex file. Can't see her yet, but the spotters have picked up a ship having the characteristics of the *Mardinex* class. It's the *Mardinex* herself, Ben, because she's the only one left in that class. Old tub, not

much good for anything except a fool's errand like this."

"Turretman to executive: Have we got a chance, tackling a first-line ship like the *Mardinex* in a destroyer?"

"Only one chance. They probably didn't staff it too well. On an abortive attempt like this, they'd put only those men they could afford to lose aboard. Probably a skeleton crew. Also the knowledge that detection meant extermination, therefore go fast and light and as frugal as possible on crewmen. That's our one chance."

"One more chance," interrupted the technician. "We have the drive pattern of the *Mardinex* in the cardex. We can bollix their drive. That's one more item in our favor."

"Right," said Ben. "What's our velocity with respect to theirs?"

"Forty miles per second."

"Tim, launch two torpedoes immediately. Pete, continue course above *Mardinex* and cross their apex at two hundred miles. Tim, as we cross their apex, drop a case of interferers. Once that is done, Pete, drop back and give Tim a chance to say hello with the AutoMacs."

"Giving them the whole thing at once?"

"Yes. And one thing more, Jimmy?"

"Technician to executive," answered Jimmy. "I'm here."

"Can you rig your drive-pattern interferer?"

"In about a minute. I've been setting up the constants from the cardex file."

"And hoping they've not been changed?" asked Ben with a smile.

"Right."

The little destroyer lurched imperceptibly as the torpedoes were launched, and then continued on its course a hundred miles to the south of the Martian ship, passing quickly above the *Mardinex* and across the apex of the Martian's nose. The turretman was busy for several seconds dropping his case of interferers from the discharge lock. The little metal boxes spread out in space and began to emit signals.

Then the destroyer dropped back, and from the turret there came the angry buzz of the AutoMacs. On the driving fin of the *Mardinex* appeared an incandescent spot that grew quickly and trailed a fine line of luminous gas behind it. Then the turrets of the *Mardinex* whipped around and Tim shouted: "Look out!"

His shout was not soon enough. On the turret of the Martian ship there appeared two spots of light that were just above the threshold of vision against the black sky. The destroyer bucked dangerously, and the acceleration fell sharply.

"Hulled us."

On the pilot's panel there appeared a number of winking pilot lights. "We'll get along," said he, studying the lights and interpreting their warning.

"Got him!" said the turretman. The top turret of the *Mardinex* erupted in a flare of white flame blown outward by the air inside of the ship.

"Can we catch him for another shot?" asked Ben pleadingly.

"Not a chance," answered Pete. "We're out of this fight."

"No, we're not," said Ben. "Look!"

Before the *Mardinex* there began to erupt a myriad of tiny, winking spots. The meteor spotting equipment and projectile intercepting equipment were flashing the interferers one after the other with huge bolts from the secondary battery of the *Mardinex*.

Ben counted the flashes and then asked the technician: "How many spotters has the *Mardinex?*"

"Thirty."

"Good. The torps have a chance then." The non-radiating torpedoes would be ignored by the spotting equipment since the emission of the interferers made them appear gigantic and dangerously close to the nonthinking equipment. The torpedoes, on the other hand, would be approaching the *Mardinex* from below and slowly enough to be considered not dangerous to the integrating equpiment. If they arrived before the spotting circuits destroyed the entire case of interferers—

The lower dome of the *Mardinex* suddenly sported a jagged hole. And almost immediately there was a flash of explosive inside of the lower portion of the Martian ship. The lower observation dome split like a cracked egg, and the glass shattered and flew out. Portholes blew out in long streamers of fire around the lower third of the *Mardinex* and a series of shattering cracks started up the flank of the ship.

"There goes number two—a clean miss," swore Ben.

"Number one did a fine job."

"I know but—"

"This'll polish 'em off," came Jimmy's voice. "Here goes the drive scrambler."

"Hey! No—!" started Ben, but the whining of the generators and the dimming of the lights told him he was too late.

The *Mardinex* staggered and then leaped forward until six full gravities. Bits of broken hull and fractured insides trailed out behind the *Mardinex* as the derelict's added acceleration tore them loose. Within seconds, the stricken Martian warship was out of the sight of the Terrans.

"No reprimand, Jimmy," said Ben Williamson soberly. "I did hope to recover Guy's body."

II.

Thomakein, the Ertinian, stopped the recorder as the Terran ship reversed itself painfully and began to decelerate for the trip back to home. He nodded to himself and made a verbal addition to the recording, stating that the smaller ship had been satisfied as to the destruction of the larger, otherwise a continuance of the fight would have been inevitable. Then Thomakein placed the recording in a can and placed it on a shelf containing other recordings. He forgot about it, then, for there was something more interesting in view.

That derelict warship would be a veritable mine of information about the culture of this system. All warships are gold mines of information concerning the technical abilities, the culture, the beliefs, and the people themselves.

Could he assume the destruction of the crew in the derelict?

The smaller ship had—unless they were out of the battle and forced to withdraw due to lack of fighting contact. That didn't seem right to Thomakein. For the smaller ship to attack the larger ship meant a dogged determination. There would have been a last-try stand on the part of the smaller ship no matter how much faster the larger ship were. At worst, the determination seemed to indicate that ramming the larger ship was not out of order.

But the smaller ship had not rammed the larger. Hadn't even tried. In fact, the smaller ship had turned and started to decelerate as soon as the larger ship had doubled her speed.

Thomakein couldn't read either of the name plates of the two fighting ships. He had no idea as to the origin of the two. As an Ertinian, Thomakein couldn't even recognize the characters let alone read them. He was forced to go once more on deduction.

The course of the larger vessel. It was obviously fleeing from the smaller ship. Thomakein played with his computer for a bit and came to two possibilities, one of which was remote, the other pointing to the fourth planet.

A carefully collected table of masses and other physical constants of the planets of Sol was consulted.

Thomakein retrieved his recording, set it up and added:

"The smaller ship, noticing the increased acceleration of the larger, assumed—probably—that the larger ship's crew was killed by the increased gravity-apparent. Since the larger ship was fleeing, it would in all probability have used every bit of acceleration that the crew could stand. Its course was dead-center for the fourth planet's position if integrated for a course based on the larger ship's velocity and direction and acceleration at and prior to the engagement.

"This fourth planet has a surface gravity of approximately one-eighth of the acceleration of the larger ship. Doubling this means that the crew must withstand sixteen gravities. The chances of any being of intelligent size withstanding sixteen gravities is of course depending upon an infinite number of factors. However, the probable reasoning of the smaller ship is that sixteen gravities will kill the crew of the larger ship. Otherwise they would have continued to try to do battle with the larger ship. Their return indicates that they were satisfied."

Thomakein nodded again, replaced the recording, and then paced the derelict *Mardinex* for a full hour with every constant at his disposal on the recorders.

At the end of that hour, Thomakein noted that nothing had reg-

istered and he smiled with assurance.

He stretched and said to himself: "I can stand under four gravities. I can live under twelve with the standard Ertinian acceleration garb. But sixteen gravities for one hour? Never."

Thomakein noted the acceleration of the derelict as being slightly over six gravities on his own accelerometer, which registered the Ertinian constant.

Then he began to maneuver his little ship toward the derelict.

Entering the *Mardinex* through the blasted observation dome was no great problem. The lower meteor spotters and most of the machinery had gone with the dome and so no pressor came forth to keep Thomakein from his intention.

The insides were a mess. Broken girders and ruined equipment made a bad tangle of the lower third of the great warship. Thomakein jockeyed the little ship back and forth inside of the derelict until he had lodged it against the remainder of a lower deck in such a manner as to keep it there under the six Terran gravities of acceleration. Then he donned spacesuit and started to prowl the ship. It was painful and heavy going, but Thomakein made it slowly.

An hour later, Thomakein heard the ringing of alarms, coming from somewhere up above, and the sound made him stop suddenly. Sound, he reasoned, requires air for propagation. The sound came through the floor, but somewhere there must be air inside of the derelict.

So upward he went through the damage. He found an air-tight door and fought the catch until it puffed open, nearly throwing him back into the damaged opening. White-faced, Thomakein held on until his breath returned, and then with a determined look at the gap below—and the place where he would have been if he had fallen out of the derelict—Thomakein tried the door again. He closed the outer door and tried the inner.

His alien grasp of mechanics was not universal enough to discover his trouble immediately. But it was logical, and logic told him to look for the air vent. He found it, and turned the valve permitting air to enter the air-tight door system. The inner door opened easily and Thomakein entered a portion of the hull where the alarm bells rang loud and clear.

He found them ringing in a room filled with control instruments. Throwing the dome of his suit back

over his head, Thomakein looked around him with interest. There was nothing in the room that logic or a grasp of elementary mechanics could solve. It did Thomakein no good to look at the Martian characters that labeled the instruments and dials, for he recognized nothing of any part of the Solar System.

He did recognize the bloody lump of inert flesh as having once been the operator of this room—or one of them he came to conclude as his search found others.

Thomakein was not squeamish. But they did litter up the place and the pools of blood made the floor slippery which was dangerous under 6-G Terran—or for Thomakein, five point six eight. So Thomakein struggled with the Martian bodies and hauled them to the corridor where he let them drop over the edge of the central well onto the bulkhead below. He returned to the instrument room in an attempt to find out what the bell-ringing could mean.

He inspected the celestial globe with some interest until he noticed that the upper limb contained some minute, luminous spheres—prolate spheroids to be exact. Wondering, Thomakein tried to look forward and up with respect to the ship's course.

His anxiety increased. He was about to meet a whole battle fleet that was spread out in a dragnet pattern. Then before he could worry about it he was through the network and some of the ships tried to follow but with no success. The *Mardinex* bucked and pitched as tractors were applied and subsequently broken as the tension reached overload values.

Thomakein smiled. Their inability to catch him plus their obvious willingness to let the matter drop with but a perfunctory try gave him sufficient evidence as to their origin.

They could never catch a ship under six gravities when the best they could do was three. The functions with respect to one another would be as though the faster ship were accelerating away from the slower ship by 3-G plus the initial velocity of the faster ship's intrinsic speed, for the pursuers were standing still.

The *Mardinex* swept out past Mars and Thomakein smiled more and more. This maze of equipment was better than anything that he had expected. The Ertinians would really get the information as to the kind of people inhabited this system.

Thomakein wandered idly from room to room, finding dead Martians and dropping them onto the bulkhead. Two he saved for the surgeons of Ertene to inspect; they were in fair physical condition compared to the rest but they were no less dead from acceleration pressure.

Eventually, Thomakein came to the room wherein Guy Maynard was lying strapped to the surgeon's table. The Ertinian opened the door and walked idly in, looking the room over quickly to see which

item of interest was the most compelling.

His glance fell upon Maynard and passed onward to the equipment on the cart beyond the Terran. Then Thomakein's eyes snapped back to the unconscious Terran and Thomakein's jaw fell while his face took on an astonished look.

Thomakein often remarked afterwards that it was a shame that no one of his photographically inclined friends had been present. He'd have enjoyed a picture of himself at that moment and he realized the fact.

Thomakein had ignored the dead Martians. They were different enough to permit him a certain amount of callousness.

But the man strapped to the table, and hooked up to the diabolical looking machine was the image of an Ertinian! Thomakein didn't know what the machine was for, but his logical mind told him that if this man, different from the rest, were strapped to a table with some sort of electronic equipment tied to his hands, feet, and head, it was sufficient evidence that this was a captive and the machine some sort of torture. He stepped forward and jerked the electrodes from Maynard's inert frame and pushed the machine backward onto the floor with a foot.

A quick check told Thomakein that the unknown man was not dead, though nearly so.

He raced through the derelict to his own ship and returned with a stimulant. The man remained unconscious but alive. His eyes opened after a long time, but behind them was no sign of intelligence. They merely stared foolishly, and closed for long periods.

Thomakein tended the man as best he could with the limited supplies from his own ship and then began to plan his return to Ertene with his find.

Days passed, and Thomakein unwillingly abandoned any hope of having this man give him any information. The man was as one dead. He could not speak, nor could he understand anything. Thomakein decided that the best thing to do was to take the unknown man to Ertene with him. Perhaps Charalas, or one of his contemporary neuro-surgeons could bring this man to himself. Thomakein diagnosed the illness as some sort of nerve shock though he knew that he was no man of medicine.

Yet the surgeons of Ertene were brilliant, and if they could bring this unknown man to himself, they would have a gold mine indeed.

So at the proper time, Thomakein took off from the derelict with the mindless Guy Maynard. By now, the derelict was far beyond the last outpost of the Solar System and obviously beyond detection. Thomakein installed a repeater-circuit detector in the wrecked ship; it would enable him to find the *Mardinex* at some later time.

So unknowing, Guy Maynard came to Ertene.

The first thing that reached across the mental gap to Guy Maynard was music. Faint, elfin music that seemed to sway and soothe the ragged edges of his mind. It came and it went depending on how he felt.

But gradually the music increased in strength and power, and the lapses were shorter. Warm pleasant light assailed him now and gave him a feeling of bodily well-being. Flashes of clear thinking found him considering the satisfied condition of his body, and the fear and nerve-racking torture of the Martian method of extracting information dropped deeper and deeper into the region of forgetfulness.

Then he realized, one day, that he was being fed. It made him ashamed to be fed at his age, but the thought was fleeting and gone before he could clutch at it and consider why he should be ashamed. One portion of his mind cursed the fleetingness of such thoughts and recognized the possibilities that might lie in the sheer contemplation of self.

There were periods in which someone spoke to him in a strange tongue. It was a throaty voice; a woman. Maynard's inquisitive section tried the problem of what was a woman and why it should stir the rest of him and came to the meager conclusion that it was standard for this body to be stirred by woman; especially women with throaty voices. The tongue was alien; he could understand none of it. But the tones were soothing and pleasant, and they seemed to imply that he should try to understand their meaning.

And then the wonder of meaning came before that alert part of Maynard's mind. What is meaning? it asked. Must things have meaning? It decided that meaning must have some place in the body's existence. It reasoned thus: There is light. Then what is the meaning of light? Must light have a meaning? It must have some importance. Then if light has importance and meaning, so must all things!

Even self!

So the voices strived to teach Ertinian to the Terran while he was still in the mindless state, and gradually he came to think in terms of this alien tongue. But he had been taught to think in Terran, and the Terran words came to mind slowly but surely.

And then came the day when Guy Maynard realized that he *was* Guy Maynard, and that he had been saved, somehow, from the terrors of the Martian inquisition. He saw the alien tongue for what it was and wondered about it.

Where was he?

Why?

The days wore on with Maynard growing stronger mentally. They gave him everything they could, these Ertinians. Scrolls were given to him to read, and the movement of reflections from his eyeballs motivated recording equipment that spoke the word he was scanning into his ear in that pleasant throaty voice. It was lightning-fast training, but it worked, once Guy's mentality went to work as an entity.

Maynard learned to read Ertinian printing and lastly the simplified cursory writing.

Then with handwriting at the gate of learning, they placed his hand around a controlled pencil, and the voice spoke as the controlled pencil wrote. They spoke Ertinian to him, not knowing Terran, though his earlier replies were recorded.

And as he strengthened, his replies made sense, and for every Ertinian word impressed upon his mind, he gave them the Terran word. They taught him composition and grammar as he taught them, and whether it was by the written script or the spoken word, the interchange of knowledge was complete.

One day he asked: "Where am I?"

And the doctor replied: "You are on Ertene."

"That I know. But where or what is Ertene?"

"Ertene is a wandering planet. We found you almost dead in a derelict spaceship and brought you back to life."

"I recall parts of that. But—Ertene?"

"Generations ago, Ertene left her parent sun because of a great, impending cataclysm. Since then we have been wandering in space in search of a suitable home."

"Sol is not far away—you will find a home there."

The doctor smiled sagely and did not comment on that. Maynard wondered about it briefly and tried to explain, but they would have none of it.

He tried at later times, but there was a reticence about their accepting Sol as a home sun. No matter what attack he tried, there was a casual reference to a decision to be made in the future.

But their lessons continued, and Guy progressed from the hospital to the spacious grounds. He sought the libraries and read quite a bit, for they urged him to, saying: "We can not entertain you continually. You are not strong enough to work, nor will we permit you to take any position. Therefore your best bet is to continue learning. In fact, Guy, you have a job to perform on Ertene. You are to become well versed in Ertinian lore so that you may converse with us freely and draw comparisons between Ertene and your Terra for us. Therefore apply yourself."

Guy agreed that if he could do nothing else, he could at least do their bidding.

So he applied himself. He read. He spoke at length with those about him. He practised with the writing machine. He accepted their customs with the air of one who feels that he must, in order that he be accepted.

And gradually he took on the manner of an Ertinian. He spoke with a pure Ertinian accent, he thought in Ertinian terms, and his hand was the handwriting of an Ertinian. And from his studies he came to the next question.

"Charalas, how could you tell me from an Ertinian?"

Charalas smiled. "We can."

"But how? It is not apparent."

"Not to you. It is one of those things that you miss because you are too close to it. It is like your adage: 'Cannot see the forest for the trees.' It will come out."

"Come out?"

"Grow out," smiled the neurosurgeon. "Your . . . beard. You notice that I used the Terran name. That is because we have no comparable term in Ertinian. That is because no Ertinian ever grew hair on his face. Daily, you . . . shave . . . with an edged tool we furnished you upon your request. You were robotlike in those days, Guy. You performed certain duties instinctively and the lack of . . . shaving equipment . . . caused you no end of mental concern. Thomakein studied your books and had a . . . razor . . . fashioned for you."

"Whiskers. I never noticed that."

"No, it is one of those things. Save for that, Guy, you could lose yourself among us. The . . . mustache . . . you wear marks you on Ertene as an alien."

"I could shave that off."

"No. Do not. It is a mark of distinction. Everyone on Ertene has seen your picture with it and therefore you will be accorded the deference we show an alien when people see it. Otherwise you would be expected to behave as we do in all things."

"That I can do."

"We know that. But there is another reason for our request. One day you will know about it. It has to do with our decision concerning alliance with Sol's family."

Guy considered. "Soon?"

"It will be some time."

Again that unwillingness to discuss the future. Guy thought it over and decided that this was something beyond him. He, too, let the matter drop for the present and took a new subject.

"Charalas, this sun of yours. It is not a true sun."

"No," laughed Charalas. "It is not."

"Nor is it anything like a true sun. Matter is stable stuff only under certain limits. If that size were truly solar matter, it would necessarily be so dense that space would be warped in around it so tight that nothing could emerge—radiation, I mean. To the observer, it would not exist. That is axiomatic. If a bit of solar matter of that size were isolated, it would merely expand and cool in a matter of hours—if it were solar-core matter it would probably be curtains for anything that tried to live in the neighborhood. Matter of that size is stable only at reasonable temperatures. I don't know the limits, but I'd guess that three or four thousand degrees kelvin would be tops. Oh, I forgot the opposite end; the very high temperature white dwarf might be that size—but it would warp space as I said before and thus do no good. Therefore a true sun of that size and mass is impossible.

"Another thing, Charalas. We are close to Sol. A light-week or less. That would have been seen . . . should have been seen by our

observatories. Why haven't they seen it?"

"Our shield," explained Charalas, "explains both. You see, Guy, in order that a planet may wander space, some means of solar effect must be maintained. As you say, nothing practical can be found in nature. Our planet drive is poorly controlled. We can not maneuver Ertene as you would a spaceship. It requires great power to even shift the course of Ertene by so much as a few degrees. We've taken luck as a course through the galaxy and have visited only those stars that have lain along our course. Trying to swing anything of solar mass would be impossible. Ertene would merely leave the sun; the sun would not answer Ertene's gravitational pull.

"But this is trivial. Obviously we have no real sun. But we needed one." Charalas smiled shyly. "At this point I must sound braggart," he said, "but it was an ancestor of mine—Timalas—who brought Ertene her sun."

"Great sounding guy," commented the Terran.

"He was. Ertene left the parent sun with only the light-shield. The light-shield, Guy, is a screen of energy that permits radiation to pass inwardly but not outwardly. Thus we collect the radiation of all the stars and lose but a minute quantity of the input from losses. That kept Ertene warm during those first years of our wandering.

"It also presented Ertene with a serious problem. The entire sky was faintly luminous. It was neither night nor day at any place on Ertene, but a half-light all the time. Disconcerting and entirely alien to the human animal. Evolutionary strains might have appeared to accept this strange condition, but Timalas decided that Intis, the lesser moon, would serve as a sun. He converted the screen slightly, distorting it so that the focal point for incoming radiation was at Intis. The lesser moon became incandescent, eventually, and serves as Ertene's sun. It is synthetic. The other radiations that prove useful to growing things and to man but which are not visible are emitted right from the inner surface of the light-shield itself. Intis serves as the source of light and most of the heat. It is a natural effect, giving us beautiful sunrises and peaceful sunsets. The radiation that causes growth and healthful effects is ever-present, because of the screen. Some heat, too, for that is included in the beneficial radiation. But the visible spectrum is directed at Intis along with a great quantity of the heat rays. Intis is small, Guy, and it is also beneficial that the re-radiation from Intis that misses Ertene and falls on the screen is converted also. Much of Ertene's power is derived from the screen itself—a back-energy collected from the screen generator."

"So the effective sun is the result of an energy shield? And this same shield prevents any radiation from leaving this region. I can see why we haven't seen Ertene.

You can't see something that doesn't radiate. But what about occultation?"

"Quite possible. But the size of the screen is such that it is of stellar size as seen from stellar distances. It is but a true point in space." Charalas smiled. "I was about to say a point-source of light similar to a star but the shield is a point-source of no-light, really. Occultation is possible but the probabilities are remote, plus the probability of a repeat, so that the observer would consider the brief occultation of the star anything but an accident to his photographic plate."

"Don't get you on that."

"It's easy, Guy. Take a star-photograph and lay a thin line across it and see how many stars are really covered by this line—which is of the thickness of the stars themselves. Too few for a non-suspecting observer to tie together into a theory. No, we are safe from detection."

"Detection?"

"Yes. Call it that. Suppose we were to pass through a malignant culture. We did, three generations ago and it was only our shield that saved us from being absorbed into that system. We would have been slaves to that civilization."

"I see."

"Do you?"

"Certainly," said Guy. "You intend to have me present the Solar Government to your leaders. Upon my tale will rest your decision. You will decide whether to join us—or to pass undetected."

"I believe you understand," said Charalas. "So study well and be prepared to draw the most discerning comparisons, for the Council will ask the most delicate questions and you should be able to discuss any phase of Ertene's social system and the corresponding Terran system."

Mentally, Guy bade good-by to Sol. He applied himself to his Ertinian lessons because he felt that if Sol were lost to him—as it might be—he could at least enter the Ertinian life as an Ertinian.

III.

Guy Maynard, the Terran, became steeped in Ertinian lore. He went at it with the same intensity that he went at anything else, and possibly driven with the heart-chilling thought that he might not be able to convince Ertene that Sol had a place for her. He saw that possibility, and prayed against it, yet he realized that Ertene was a planet of her own mind and that they might decide against alliance. It was a selling job he had to do.

And if not—

Guy Maynard would have to remain on Ertene. Therefore in either case it would serve him best to become as Ertinian as possible. He did not believe that they would exile him—that would be dangerous. Nor did he believe that death would accompany his failure to convince Ertene of their place around Sol. The obvious course in case of failure would be to permit him the freedom of the planet; to be-

come in effect, an Ertinian.

He'd be under watch, of course. Escape would prove dangerous for their integrity. Imprisonment was not impossible, but he hoped that his failure to convince would not be so sorry as to have them suspect him.

Of course, an opportunity to escape would be taken, unless he gave his word of honor. Yet, he had sworn the oath of an officer in Terra's space fleet, and that oath compelled him to serve Terra in spite of danger, death, or dishonor to self. He must not give his parole—

Guy fought himself over that problem for days and days. It led him in circular thinking, the outlet to which would be evident only when he found out the Ertinian reaction. Too much depended on that trend; there were too many *if's* standing between him and any plan for the future.

He forgot his mental whirl in study. He investigated Ertinian science and tucked a number of items away in his memory. He visited the observatory and after a number of visits he plotted Ertene in the celestial sphere within a few hundred thousand miles. That, too, he filed away in his memory along with the course of the wanderer.

He learned that his place of convalescence was no hospital, but Thomakein's estate. It staggered him. Thomakein was—must be—a veritable dynamo of energetic mentality to have the variety of interests as reflected in the trappings about the estate. The huge library, the observatory, the laboratories. How many of the things he saw and studied were Thomakein's personal property he would never know; though he did know that some of them came from museums and institutes across the planet.

He wondered about Thomakein. He had never seen his saviour since his mind had come back. He recalled vague things, but nothing cogent. He asked Charalas about Thomakein.

"Thomakein's main problem is Sol," explained Charalas. "A problem which you have made easy for him. However, he is on the derelict, studying the findings there. A warship is a most interesting museum of the present, you know. Often things of less than perfect operation are there; things that will eventually become perfected and established into private use. It is almost a museum of the future. Thomakein will learn much there and he has been commissioned to remain on the derelict until he has catalogued every item on it."

"Lone life, isn't it?" asked Guy.

"He has friends. Last I heard from him, he had sealed the usable portion of the derelict against the void, and was turning the course to bring it toward Ertene. Eventually the wreck will circle Ertene. Perhaps we may attempt to land it here."

"It'll be a nice museum piece," said Guy, "but it will not endear you to those of Mars."

"I know. Of course if we accept Sol's offer, we will destroy it completely."

"Keep it," said Guy, shrugging his shoulders. "Ertene will find little in common with Mars. It will be Terra and Ertene; together we will form the nucleus of Solar power."

"So?"

"Naturally. Ertene and Terra are the most alike, even to the flora and fauna."

"I see."

Charalas let the matter drop as he did before. Guy tried to open the line of thought again, but met with no success. It was not a matter of indifference to Guy's arguments, but more a complete disinclination to make any sort of statement prior to the decision of the Council of Ertene. Realizing that this decision was one of the single-try variety, Guy studied hard during the next few days. There would be no appeal even though he tried to get another hearing during the rest of his life.

He wondered how soon it would be.

Charalas landed on Thomakein's estate in a small flier and asked Guy if he would like to see the famous Hall of History. They flew a quarter of the way around the planet, and during the trip, Charalas pointed out scenes of interest. It was enlightening to Guy, who hadn't seen anything beyond a few miles of Thomakein's estate. There were farms laid out on the production-line scale while the cities and towns that housed the farmers were sprawling, rustic villages of simple beauty. The larger cities had evolved from the square-block and rubber-stamp home kind to specialized aggregations in which the central, business sections were close-knit while the residences were widespread and well apart, giving each family adequate breathing room.

"The railroad," smiled Charalas, "is still with us. It will never leave, because shipments of heavy machinery of low necessity can be transported cheaper that way. Like the barges that ply the rivers with coal, ore, and grain, they are powered with adaptations of the space drive, but they are none the less barges or trains."

"They've found that, too," laughed Guy. "There is little economic value in trying to ship a million tons of coal by flier."

"Normally, you should say. The slowest conveyor system is rapid if the conveyor is always filled and the material is not perishable. Coal and ore have been here for eons. Therefore it is no hardship to wait for six weeks while a given ton of ore gets across the continent, provided that the user can remove a ton of ore from the conveying system simultaneously with the placement of another ton that will not get there for six weeks."

"Sounds correct, though I've never thought of it in that manner," said Guy thoughtfully. "But that must be why it is done. We hull ore across space untended, and in pre-calculated orbits, picking it up at Terra from Pluto, for instance. The driverless and crewless hull is packed with ore, towed into space by a space tug and set

into its orbit, the tug then returning to the shipping area to await the next hull. The hull may take a couple of years to get to Terra, but when it does, it begins to emit a finder-signal and Terran space tugs pick the hull up and lower it to Terra. The hulls are returned with unperishable supplies to the Plutonian miners."

"We hadn't the necessity of applying that thought to space shipping," answered Charalas. "Tonis, the larger moon, is so close that special shipping methods are not needed. We have but a few colonists there, most of which are members ofthe laboratory staff."

"You've found moon laboratories essential in space work, too?" asked Guy.

"Naturally. Tonis is airless and upon it is the Ertinian astronomical laboratory."

"Moons—even sterile moons—are good for that," said Guy. "They—Say, Charalas, what is that collection of buildings below here? They look like something extra-special."

"They are. That is the place we're going to see."

Charalas put the flier into a steep dive and landed in the open space between the buildings. They entered the long, low building at the end opposite the most ornate building of the seven that surrounded the landing area and Charalas told the receptionist that they were expected.

The long hall was excellently illuminated, and on either side of the corridor were murals; great twelve-foot panels of rare color and of photographic detail. Upon close examination they proved to be paintings.

The first panel showed an impression of the formation of Ertene, along with the other eleven planets of Ertene's parent sun. It was colorful, and impressionistic in character rather than an attempt to portray the actual cataclysm that formed the planets. The next few panels were of geologic interest, giving the impressions of Ertene through the long, geologic periods. There were dinosaur-picturizations next, and the panels brought them forward in irregular steps through the carboniferous; through the glacial ages; through the dawn ages; and finally into the coming of man to power.

The next fourteen panels were used in the rise of man on Ertene from the early ages to full, efficient civilization. They were similar to a possible attempt to portray a similar period on Terra, showing wars, life in the cities of power during the community-power ages, and the fall of several powerful cities.

Then the rise of widespread government came with its more closely-knit society made possible by better means of communication and transportation. This went on and on until the facility of the combining factors made separate governments on Ertene untenable, and there were seven great, fiery panels of mighty, widespread wars.

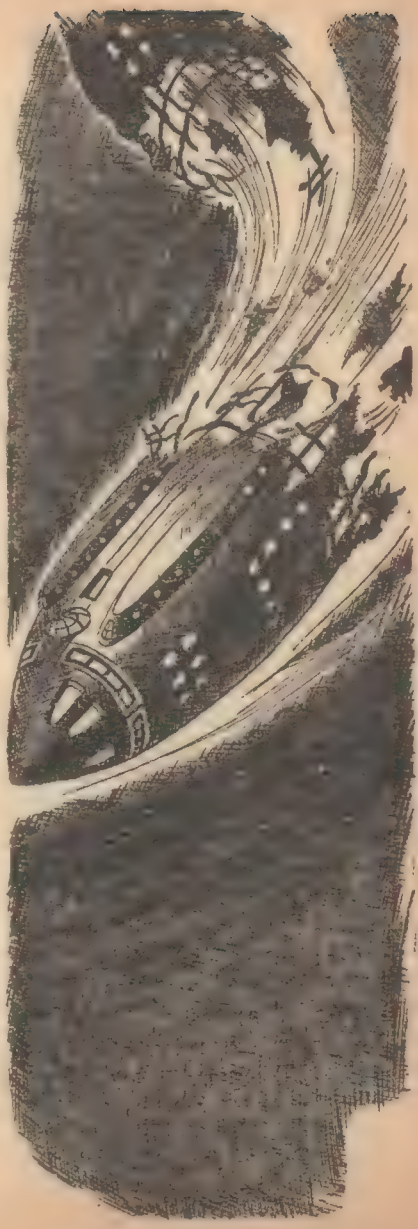
"Up to here, it is similar to ours," commented Guy.

"And here it changes," said

Charalas. "For the next panels show the impending doom of Ertene's parent sun. The problem of space had been conquered but the other planets were of little interest to Ertene. We fought about four interplanetary wars as you see here, all against alien races. Then came trouble. The odd chance of a runaway star coming near Ertene did happen, and we faced the decision of living near an unstable sun for centuries, for our astronomers calculated that the two stars would pass close enough to cause upheavals in the suns that would result in instability for thousands, perhaps millions of years."

"Instability might not have been so bad," said Guy thoughtfully, "if it could be predicted. No, I'm not speaking in riddles," he laughed. "I may sound peculiar, saying that it would be possible to predict instability. But a regular variable of the cepheid type is predictable instability."

"True. But we had no basis for prediction. After all, it would have been taking a chance. Suppose that the instability had caused a nova? Epitaphs are nice but none the less final. We left hundreds of years before the solar proximity. Now we know that we might have survived, but as you know, we can not swerve Ertene's course readily and though we are slowly turning, the race may have died out and gone for a galactic eon before we could return. Once the race dies out—or the interest in returning to a certain sun back there in the depths of the galaxy dies—we will cease



to turn. We may fine a haven somewhere, before then."

"You were speaking of years," said Guy. "Was that a loose reference or were you approximating my conception of a year?"

"A *year* is a loose term indeed, no matter by whom it is used," said Charalas. "To you, it is three hundred and sixty-five, and about a quarter, days. A day is one revolution of Terra. From Mars, say, a Terran year is something else entirely. Mars, of course, is not too good an example for its sidereal day is very close to Terra's. But your Venus, with its eighteen hour day—eighteen Terran hours—sees Terra's year as four hundred eighty-six, plus, days. On Ertene, we have no year. We had one, once. It was composed of four hundred twelve point seven zero four two two nine three one days, sidereal. Now, our day is different, since the length of the solar day depends upon the progression of the planet about its luminary. Our luminary behaves as a moon with a high ecliptic-angle as I have explained. No, Guy, I have been mentally converting my *year* to your year, by crude approximation."

The next panel was an ornate painting of the Ertinian system, showing—out of scale for artistic purpose—the planets and sun, with Ertene drawing away in a long spiral.

"For many years we pursued that spiral, withdrawing from the sun by slow degrees. Then we broke free." Charalas indicated the panel which showed Ertene in the foreground while the clustered system was far behind.

They passed from panel to panel, all of which were interesting to Guy Maynard. There was a series of the first star contacted by Ertene. It was a small system, cold and forbidding, or hot and equally forbidding. The outer planets were in the grip of frozen air, and the inner planets bubbled in moltenness. "This system was too far out of line to turn. It was our first star, and we might have stayed in youthfulness. Now, we know better."

The next panel showed a dimly-lighted landscape; a portrayal of Ertene without its synthetic sun. The luminous sky was beautiful in a nocturnal sort of way; to Guy it was slightly nostalgic for some unknown reason, at any rate it was the soul of sadness, that landscape.

Charalas shook his head and then smiled. He led Guy to the next panel, and there was a portrait of an elderly man, quite a bit older than Charalas though the neuro-surgeon was no young man. "Timalas," said Charalas proudly. "He gave us the next panel."

The following panel was a similar scene to the dismal one, but now the same trees and buildings and hills and sky were illuminated by a sun. It was a cheerful, uplifting scene compared to the soul-clouding darkness.

Ertene was a small sphere encircled by a band of peaceful black in a raving sky of fire and flame. Three planets fought in the death

throes, using every conceivable weapon. Space was riven with blasting beams of energy and segregated into square areas by far-flung cutting planes. Raging energy consumed spots on each of the planets and the corners of the panel were tangled masses of broken machinery and burning wreckage, and the hapless images of trapped men. But Ertene passed through this holocaust unseen because of Timalas' light-shield.

"He saved us that, too," said Charalas reverently. "We could not have hoped to survive in this. Our science was not up to theirs, though the aid of a derelict or two gave us most of their science of war. I doubt that Terra herself could have survived. We passed unseen, though we worried for a hundred years lest they find us."

A race of spiders overran four of the planets of the next panel. They were unintelligent, there was a questioning air to the panel, as though posing the query as to how this race of spiders had crossed the void. And the picture of an Ertinian dying because contact with one of the spiders indicated their reason for not remaining.

The next panel showed a whole system with ammoniated atmosphere. "It was before the last panel," said Charalas, "that Ertene became of age as far as the wanderlust went. We knew that we could survive. We wanted no system wherein Ertene would be alone. Of what use to civilization would a culture be if its people could never leave the home planet?"

"No," agreed Guy. "Once a race has conquered space, they must use it. It would restrict the knowledge of a race not to use space."

"So we decided never to accept a system wherein we could not travel freely to other planets. Who knows, but the pathway to the planets may be but the first, faltering step to the stars?"

"We'd never have reached the planets if we'd never flown on the air," agreed Guy.

"We prefer company, too," smiled Charalas, pointing out the next panels. One was of a normal system but in which the life was not quite ready for the fundamentals of science and therefore likely to become slave-subject to the Ertinian mastery. The next was a system in which the intelligent life had overrun the system and had evolved to a high degree—and Ertene might have been subject to them if they had remained. "Unfortunately we could learn nothing from them," said the Ertinian. "It was similar to an ignorant savage trying to learn something from us."

Then they came to a panel in which there were ten planets. It was a strange collection of opposites all side by side. There were several races, some fighting others, some friendly with others. Plenty and poverty sat hand in hand, and in one place a minority controlled the lives of the majority while professing to be ruled by majority-rule. Men strived to perfect medicine and increase life-expectancy and other men fought and killed by the hundreds of thousands. A cold and

forbidding planet was rich in essential ore, and populated by a semi-intelligent race of cold-blooded creatures. The protectors of these poor creatures were the denizens of a high civilization, who used them to fight their petty fights for them, under the name of unity. For their trouble, they took the essential ores to their home planet and exchanged items of dubious worth. The trespass of a human by the natives of a slightly populated moon caused the decimation of the natives, while the humans used them by the hundreds in vivisection since their anatomy was quite similar to the human's.

"Where is Ertene?" asked Guy.

"Ertene is not yet placed," said Charalas.

"No?" asked Guy in wonder.

"No," said Charalas with a queer smile. "Ertene is still not sure of her position. You see, Guy, that system is Sol."

Guy Maynard stood silent, thinking. It was a blow to him, this picturization of the worlds of Sol as seen through the eyes of a totally alien race. His own feelings he analyzed briefly, and he knew that in his own heart, he was willing to shade any decisions concerning the civilization of Ertene in the Ertinian favor; had any dispute between Ertene and a mythical dissenter, Guy would have had his decision weighted in favor of the wanderer for one reason alone.

Ertinians were human to the last classification!

Guy smiled inwardly. "Blood is thicker than water," he thought to himself, and he knew that while the old platitude was meant to cover blood-relations who clung together in spite of close bonds with friends not of blood relationship, it could very well be expanded to cover this situation. Obviously he as a Terran would tend to support a *human* race against a merely *humanoid* race. He would fight the Martians for Ertene just as he would fight them for Terra.

Fighting Ertene itself was unthinkable. They were too human; Ertene was too Terran to think of strife between the two worlds. Being of like anatomy, they would and should cling together against the whole universe of alien bodies.

But—

He had spoken to Charalas, to the nurses, to the groundkeepers, and to the scientists who came to learn of him and from him. He had told them of Terra and of the Solar System. He had explained the other worlds in detail and his own interpretation of those other cultures.

And still they depicted Terra in no central light. Terra did not dominate the panel. It vied with the other nine planets and their satellites for the prominence it should have held.

What was wrong?

Knowing that he would have favored Ertene for the anatomical reasons alone, Guy worried. Had his word-picture been so poor that Ertene gave the other planets their place in the panel in spite of the natural longing to place their own

kind above the rest?

"I should think—" he started haltingly, but Charalas stopped him.

"Guy Maynard, you must understand that Ertene is neutral. Perhaps the first neutral you've ever seen. Believe that, Guy, and be warned that Ertene is capable of making her own, very discerning decision."

Guy did not answer. He knew something else, now. Ertene was not going to be easily convinced that Sol was the place for them. She was neutral, yes, but there was something else.

Ertene had the wanderlust!

For eons, Ertene had passed in her unseen way through the galaxy. She had seen system after system, and the lust for travel was upon her. Travel was her life, and had been for hundreds of generations.

Her children had been born and bred in a closed system, free from stellar bonds. Their history was a vast storehouse of experience such as no other planet had ever had. Every generation brought them to another star and each succeeding generation added to the wisdom of Ertene as it extracted or tried to extract some bit of knowledge from each system through which Ertene passed.

With travel her natural life, the wandering planet would be loath to cease her transient existence.

Like a man who has spent too many years in bachelorhood, flitting like a butterfly from lip to lip, Ertene had become inured to a single life. It would take a definite attraction to swerve her from her self-sufficiency.

These things came to Maynard as he stood in thought. He knew then that his was no easy job. Not the simple proposition of asking Ertene to join her own kind in an orbit about Sol. Not the mere signing of a pact would serve. Not the Terran-shaded history of the worlds of Sol with the Terran egotism that did not admit that Terra could possibly be wrong.

Ertene must be made to see the attractiveness of living in Maynard's little universe. It must be made more attractive than the interesting possibilities offered by the unknown worlds that lie ahead on her course through the galaxy.

All this plus the natural reticence of Ertene to become involved in a system that ran rife with war. The attractiveness of Sol must be so great that Ertene would remain in spite of war and alien hatred.

And Maynard knew in his heart that he was not the one to sway them easily. Part of his mind felt akin to their desire to roam. Even knowing that he would not live on Ertene to see the next star he wanted to go with them in order that his children might see it.

And yet his honor was directed at the service of Terra. His sacred oath had been given to support and strive to the best interest of Terra and Sol.

He put away the desire to roam with Ertene and thought once more of the studying he must do to convince Ertene of the absolute foolishness of continuing in their search

for a more suitable star than Sol about which to establish a residence.

Maynard turned to Charalas and saw that the elderly doctor had been watching him intently. Before he could speak, the Ertinian said: "It is a hard nut to crack, lad. Many have tried but none have succeeded. Like most things that are best for people, they are the least exciting and the most formal, and people do not react cheerfully to a formal diet."

Maynard shook his head. "But unlike a man with ulcers, I cannot prescribe a diet of milk lest he die. Ertene will go on living no matter whether I speak and sway them or whether I never say another word. I am asked to convince an entire world against their will. I can not tell them that it is the slightest bit dangerous to go on as they have. In fact, it may be dangerous for them to remain. In all honesty, I must admit that Terra is not without her battle scars."

Charalas said, thoughtfully: "Who knows what is best for civilization? We do not, for we *are* civilization. We do as we think best, and if it is not best, we die and another civilization replaces us in Nature's long-time program to find the real survivor."

He faced the panel and said, partly to himself and partly to Guy:

"Is it best for Ertene to go on through time experimenting? Gathering the fruits of a million civilizations bound forever to their stellar homes because of the awful abyss between the stars? For the planets all to become wanderers would be chaos.

"Therefore is it Nature's plan that Ertene be the one planet to gather unto herself the fruit of all knowledge and ultimately lie barren because of the sterility of her culture? Are we to be the sponge for all thought? If so, where must it end? What good is it? Is this some great master plan? Will we, after a million galactic years, reach a state where we may disseminate the knowledge we have gained, or are we merely greedy, taking all and giving nothing?

"What are we learning? And, above all, are we certain that Ertene's culture is best for civilization? How may we tell? The strong and best adapted survive, and since we are no longer striving against the lesser forces of Nature on our planet, and indeed, are no longer striving against those of anti-social thought among our own people—against whom or what do we fight?

"Guy Maynard, you are young and intelligent. Perhaps by some whimsy of fate you may be the deciding factor in Ertene's aimlessness. We are here, Guy. We are at the gates to the future. My real reason for bringing you to the Center of Ertene is to have you present your case to the Council."

He took Guy's arm and led him through the door at the end of the corridor. They went into the gilt-and-ivory room with the vast hemispherical dome and as the door slowly closed behind them, Guy Maynard, Terran, and Charalas, Er-

tinian, stood facing a quarter-circle of ornate desks behind which sat the Council.

Obviously, they had been waiting.

IV.

Guy Maynard looked reproachfully at Charalas. He felt that he had been tricked. that Charalas had kicked the bottom out of his argument and then had forced him into the debate with but an impromptu defense. He wondered how this discussion was to be conducted, and while he was striving to collect a lucid story, part of his mind heard Charalas going through the usual procedure for recording purposes.

"Who is this man?"

"He is Junior Executive Guy Maynard of the Terran Space Patrol."

"Explain his title."

"It is a rank of official service. It denotes certain abilities and responsibilities."

"Can you explain the position of his rank with respect to other ratings of more or less responsibility?"

Charalas counted off on his fingers. "From the lowest rank upward, the following titles are used: Junior Aide, Senior Aide, Junior Executive, Senior Executive, Sector Commander, Patrol Marshal, Sector Marshal, and Space Marshal."

"These are the commissioned officers? Are there other ratings?"

"Yes, shall I name them?"

"Prepare them for the record. There is no need of recounting the noncommissioned officials."

"I understand."

"How did Guy Maynard come to Ertene?"

"Maynard was rescued from a derelict spaceship."

"By whom?"

"Thomakein."

"Am I to assume that Thomakein brought him to Ertene for study?"

"That assumption is correct."

"The knowledge of the system of Sol is complete?"

"Between the information furnished by Guy Maynard and the observations made by Thomakein, the knowledge of Sol's planets is sufficient. More may be learned before Ertene loses contact, but for the time, it is adequate."

"And Guy Maynard is present for the purpose of explaining the Terran wishes in the question of whether Ertene is to remain here?"

"Correct."

The councilor who sat in the center of the group smiled at Guy and said: "Guy Maynard, this is an informal meeting. You are to rest assured we will not attempt to goad you into saying something you do not mean. If you are unprepared to answer a given question, ask for time to think. We will understand. However, we ask that you do not try to shade your answers in such a manner as to convey erring impressions. This is not a court of law; procedure is not important. Speak when and as you desire and understand that you will not be called to account for slight breaches of etiquette, since we all know that formality is a deterrent to the real point in argument."

Charalas added: "Absolute for-

mality in argument usually ends in the decision going to the best orator. This is not desirable, since some of the more learned men are poor orators, while some of the best orators must rely upon the information furnished them by the learned."

The center councilor arose and called the other six councilors by name in introduction. This was slightly redundant since their names were all present in little bronze signs on the desks. It was a pleasantry aimed at putting the Terran at ease and offering him the right to call them by name.

"Now," said Terokar, the center one, "we shall begin. Everything we have said has been recorded for the records. But, Guy, we will remove anything from the record that would be detrimental to the integrity of any of us. We will play it back before you leave and you may censor it."

"Thank you," said Guy. "Knowing that records are to be kept as spoken will often deter honest expression."

"Quite true. That is why we permit censoring. Now, Guy, your wishes concerning Ertene's alliance with Sol."

"I invite Ertene to join the Solar System."

"Your invitation is appreciated. Please understand that the acceptance of such an invitation will change Ertene's social structure forever, and that it is not to be taken lightly."

"I realize that the invitation is not one to accept lightly. It is a large decision."

"Then what has Sol to offer?"

"A stable existence. The commerce of an entire system and the friendship of another world of similar type in almost every respect. The opportunity to partake in a veritable twinship between Ertene and Sol, with all the ramifications that such a brotherhood would offer."

"Ertene's existence is stable, Guy. Let us consider that point first."

"How can any wandering program be considered stable?"

"We are born, we live, and we die. Whether we are fated to spend our lives on a nomad planet or ultimately become the very center of the universe about which everything revolves, making Ertene the most stable planet of them all, Ertinians will continue living. When nomadism includes the entire resources of a planet, it can not be instable."

"Granted. But do you hope to go on forever?"

"How old is your history, Guy?"

"From the earliest of established dates, taken from the stones of Assyria and the artifacts of Maya, some seven thousand years."

Charalas added a lengthy discussion setting the length of a Terran year.

"Ertinian history is perhaps a bit longer," said Terokar. "And so who can say 'forever'?"

"No comment," said Guy with a slight laugh. "But my statements concerning stability are not to be construed as the same type of instability suffered by an itinerant

human. He has no roots, and few friends, and he gains nothing nor does he offer anything to society. No, I am wrong. It *is* the same thing. Ertene goes on through the eons of wandering. She has no friends and no roots and while she may gain experience and knowledge of the universe just as the tramp will, her ultimate gain is poor and her offering to civilization is zero."

"I dispute that. Ertene's life has become better for the experience she has gained and the knowledge, too."

"Perhaps. But her offering to civilization?"

"We are not a dead world. Perhaps some day we may be able to offer the storehouses of our knowledge to some system that will need it. Perhaps we are destined to become the nucleus of a great, galactic civilization."

"Such a civilization will never work as long as men are restrained as to speed of transportation. Could any pact be sustained between planets a hundred light-years apart? Indeed, could any pact be agreed upon?"

"I cannot answer that save to agree. However, somewhere there may be some means of faster-than-light travel and communication. If this is found, galactic-wide civilization will not only be possible but a definite expectation."

"You realize that you are asking for Ertene a destiny that sounds definitely egotistic?"

"And why not? Are you not sold on the fact that Terra is the best planet in the Solar System?"

"Naturally."

"Also," smiled Charalas, "the Martians admit that Mars is the best planet."

"Granted then that Ertene is stable. Even granting for the moment that Ertene is someday to become the nucleus of the galaxy. I still claim that Ertene is missing one item." Guy waited for a moment and then added: "Ertene is missing the contact and commerce with other races. Ertene is self-sufficient and as such is stagnant as far as new life goes. Life on Ertene has reached the ultimate—for Ertene. Similarly, life on Terra had reached that point prior to the opening of space. Life must struggle against *something,* and when the struggle is no longer possible—when all possible obstruction has been circumvented—then life decays."

"You see us as decadent?"

"Not yet. The visiting of system after system has kept you from total decadence. It is but a stasis, however. Unless one has the samples of right and wrong from which to choose, how may he know his own course?"

"Of what difference is it?" asked the councilor named Baranon. "If there is no dissenting voice, if life thrives, if knowledge and science advance, what difference does it make whether we live under one social order or any other? If thievery and wrongdoing, for instance, could support a system of social importance, and the entire population lives under that code and thrives, of what necessity is it to change?"

"Any social order will pyramid," said Guy. "Either up or down."

"Granted. But if all are prepared to withstand the ravages of their neighbors, and are eternally prepared to live under constant strife, no man will have his rights trod upon."

"But what good is this eternal wandering? This everlasting eye upon the constantly receding horizon? This never ending search for the proper place to stop in order that this theoretical galactic civilization may start? At Ertene's state of progress, one place will be as good as any other," said Guy.

"Precisely, except that some places are definitely less desirable. Recall, Guy, that Ertene needs nothing."

"I dispute that. Ertene needs the contact with the outside worlds."

"No."

"You are in the position of a recluse who loves his seclusion."

"Certainly."

"Then you are in no position to appreciate any other form of social order."

"We care for no other social order."

"I mentioned to Charalas that in my eyes, you are wrong. That I am being asked to prescribe for a patient who will not die for lack of my prescription. I can not even say that the patient will benefit directly. My belief is as good as yours. I believe that Ertene is suffering because of her seclusion and that her peoples will advance more swiftly with commerce between the planets—and once again in interstellar space, Ertene will have no planets with which to conduct trade."

"And Sol, like complex society, will never miss the recluse. Let the hermit live in his cave, he is neither hindering nor helping civilization."

"Indirectly, the hermit hinders. He excites curiosity and the wonder if a hermit's existence might not be desirable and thus diverts other thinkers to seclusion."

"But if the hermit withdraws alone and unnoticed, no one will know of the hermitage, and then no one will wonder."

"But *I* know, and though no one else in the Solar System knows, I am trying to bring you into our society. I have the desire of brotherhood, the gregarious instinct that wants to be friend with all men. It annoys me—as it annoys all men—to see one of us alone and unloved by his fellows. I have a burning desire to have Ertene as a twin world with Terra."

"But Ertene likes her itinerant existence. The fires that burn beyond the horizon are interesting. Also," smiled Terokar, "the grass is greener over there."

"One day you will come to the end of the block," said Guy, "and find that the grass is no greener anywhere, with the exception that you now have no more grass to look at, plus the sorry fact that you cannot return. A million galactic years from now, Ertene will have passed through the galaxy and will find herself looking at intergalactic space. Then what?"

"Then our children will learn to live in a starless sky for a hundred thousand generations. Solarians live in a sky of constant placement; Ertene's sky is ever changing and all sky maps are obsolete in thirty or forty years. You must remember that to us, wandering is the normal way of life. Some of us believe that we may eventually return to our parent sun. We may. But all of us believe that we would find our parent sun no more interesting than others. No Guy, I doubt that we will stop there either."

"You are assuming that you will not remain at Sol?"

"We are a shy planet. We do not like to change our way of life. You are asking us to give up our life and to accept yours. It is similar to a man asking a woman to marry. But a woman is not completely reversed in her life when she marries. Here you are asking us to cleave unto you forever—and there is no bond of love to soften the hard spots."

"I did mention the bond of brotherhood," said Guy.

"Brotherhood with what?" asked Terokar. "You ask us to enter a bond of twinship with a planet that is the center of strife. You ask us in the name of similarity to join you—and help you gain mastery over the Solar System."

"And why not?"

"Which of you is right? Is the Terran combine more righteous than the Martian alliance?"

"Certainly."

"Why?"

Guy asked for a moment to think. The room was silent for a moment and then he said, slowly and painfully: "I can think of no other reason than the trite and no-answer reason: 'We're right because we're right!' The Martian combine fights us to gain the land and the commerce that we have taken because of superiority in space."

"A superiority given merely because of sheer size," said Baranon. "The Martians, raised under a gravity of less than one third of Terra's find it difficult to keep pace with the Terrans, who can live under three times as much acceleration. Battle under such conditions is unfair, and the fact that the Martians have been able to survive indicates that their code is not entirely wrong."

Charalas nodded. "Any code that is entirely in error will not be able to survive."

"So," said Terokar, "you ask us to join your belligerent system. You ask us to emerge from our pleasure and join you in a struggle for existence. You ask that we give up the peace that has survived for a thousand years, and in doing so you ask that we come willingly and permit our cities to be war-scarred and our men killed. You ask that we join in battle against a smaller, less adapted race that still is able to survive in spite of its ill-adaption to the rigors of space."

Guy was silent.

"Is that the way of life? Must we fight for our life? Strife is deplorable, Guy Maynard, and I am saying that to you, who come of a

planet steeped in strife. You wear a uniform—or did—that is dedicated to the job of doing a better job of fighting than the enemy. Continual warlike activity has no place on Ertene.

"Plus one other thing, Guy Maynard. You are honorable and your intent is clear. But your fellows are none too like you. Ertene would become the playground of the Solar System. There would be continual battles over Ertene, and Ertene with her inexperience in warfare would be forced to accept the protection of Terra. That protection would break down into the same sort of protection that is offered the Plutonians by a handful of Terrans. In exchange for 'protection' against enemies that would possibly be no better or worse, the Plutonians are stripped of their metal. They are not accorded the privilege of schooling because they are too ignorant to enter even the most elementry of schools. Besides, schooling would make them aware of their position and they might rebel against the system that robs them of their substance under the name of 'protection.' Protection? May the Highest Law protect me from my protectors!" Terokar's lips curled slightly. "Am I not correct? Have not the Plutonians the right to life, liberty, and the pursuit of happiness? It would be a heavy blow to Terra if the third planet were forced to pay value for the substance that comes from Pluto."

"After all," said Guy, "if Terra hadn't got there first, Mars would be doing the same thing."

"Granted," said Baranon. "Absolutely correct. But two wrongs do not make a right. Terra is no worse than Mars. But that does not excuse either of them. They are both wrong!"

"Are you asking Terra to change its way of life?" demanded Guy.

"You are asking Ertene to change. We have the same privilege."

"Obviously in a system such as ours a completely altruistic society would be wiped out."

"Obviously," said Baranon.

"Then—"

"Then Ertene will change its way of life—providing Terra changes hers."

"Mars—"

"Mars will have to change hers, too. Can you not live in harmony?"

"Knowing what the Martians did to me—can you expect me to greet one of them with open arms?"

"Knowing what you have done to them, I wouldn't expect either one of you to change your greetings. No, Guy, I fear that Ertene will continue on her path until such a time as we meet a system that is less belligerent and more adapted to our way of life."

"Then I have failed?"

"Do not feel badly. You have failed, but you were fighting a huge, overwhelming force. You fought the inheritance of a hundred generations of wanderers. You fought the will of an integrated people who deplore strife. You fought the desire of everyone on Ertene, and since no Ertinian could change Solar society, we cannot expect a Terran to change Ertinian ideals. You failed, but it is no disgrace to fail against such an overwhelming defense."

Guy smiled weakly. "I presume that I was fighting against a determined front?"

"You were trying to do the most difficult job of all. In order to have succeeded, you would first have had to unsell us on our firm convictions, and then sell us the desirability of yours. A double job, both uphill."

"Then I am to consider the matter closed?"

"Yes. We have decided not to remain."

"You decided that before I came in," said Guy bitterly.

"We decided that a thousand years before you were born, so do not feel bitter."

"I presume that a change in your plans is out of the question even though further information on Sol's planets proves you wrong?"

"It will never be brought up again."

"I see," said Guy unhappily. "Part of my desire to convince you was the hope of seeing my home again."

"Oh, but you will," said Charalas.

Guy was dumfounded. He could hardly believe his ears. He asked for a repeat, and got it. It was still amazing. To Guy, it was outright foolishness. He wouldn't have trusted anyone with such a secret. To permit him to return to Terra with the knowledge he had—

"Charalas, what would prevent

me from bringing my people to Ertene? I could bring the forces of Terra down about your very ears."

"But you will not. We have a strict, value-even trade to offer you."

"But it would be so easy to keep me here."

"We could not restrain you without force. And if we must rely upon your honor, we'd be equally reliant whether you be here or on Terra."

"Here," said Guy dryly, "I'd be away from temptation. If I were tempted to tell, there'd be no one to tell it to."

"We must comply with an ancient rule," explained Terokar. "It says specifically that no man without Ertinian blood may remain on Ertene. It was made to keep the race pure when we were still about our parent sun and has never been revoked. We wouldn't revoke it for you alone."

"But permitting me to go free would be sheer madness."

"Not quite. We are mutually indebted to one another, Guy. There is the matter of knowledge. You gave freely of yours, we gave you ours. We have gained some points that were missing in our science, you have a number of points that will make you rich, famous, and remembered. Use them as your own, only do it logically in order that they seem to be discoveries of your own. You admit the worth of them?"

"Oh, but yes," said Guy eagerly. "Wonderful—"

"Then there is no debt for knowledge?"

"If any, I am in your debt."

"We'll call it even," said Baranon, dryly.

"Then there is the matter of life," said Terokar. "You know how you were found?"

Guy shook his head in wonder. "I had been through the Martian idea of how to get information out of a reluctant man," he said slowly. "I know that their methods result in a terrible mindless state which to my own belief is worse than death itself. I know that as I lost consciousness, I prayed for death to come, even though I knew that they would not permit it."

"We found you that way. You know. And we brought you back to life. You owe us that."

"Indeed I do."

"Then for your life, we demand our life in return."

"I do not understand."

"Your life is yours. We ask that you say nothing of us—for we feel that we will die if we are found. At least, the integrity of Ertene is at stake. In any event, we will not be taken, you may as well know that. And when I say die, I mean that Ertene will not go on living in the way we want her to live. Therefore you will disclose nothing that will point our way to anyone."

"And you are willing that I should return to Terra with such an oath? What of my oath to Terra?"

"Do you feel that your presence on Ertene will benefit Terra in some small way?" asked Charalas.

"Now that you have given me

the things we spoke of before, I do."

"Then," said Charalas, "consider this point. You may not return unless you swear to keep us secret. You may not give Terra the benefit of your knowledge unless you deprive them of Ertene. Is that clear?"

"If I may not return to Terra, and may not remain on Ertene, I can guess the other alternative and will admit that I do not like it. On the returning angle, about all I can do is to justify myself in my own mind that I have done all that I can by bringing these scientific items back with me. Since doing the best I can for Terra includes keeping your secret, I can do that also. But tell me, how do you hope to cover the fact that I've been missing for almost a year? That will take more than mere explanation."

"The process is easy," said Charalas. "We have one of the lifeships from the derelict. It was slightly damaged in the blast. It is maneuverable, but unwieldy. Evidence has been painstakingly forged. Apparently you will have broken your straps under the shock of the blast—and before the torture reached its height—and you found yourself in a derelict with no one left alive but yourself. You were hurt, mentally, and didn't grasp the situation clearly. There was no way to signal your plight in secrecy, and open signaling would have been dangerous since you were too close to Mars.

"You found the lifeship and waited until you could safely take off. The derelict took a crazy course, according to the recorded log in your own handwriting, and headed for interstellar space. You took off at the safe time and have been floating free in the damaged lifeship. You've been on a free orbit for the best part of a year."

"Sounds convincing enough."

"The evidence includes empty air cans, your own fingerprints on everything imaginable, a dulled can opener and the remnants of can labels that have fallen into nooks and crannies of the ship. The water-recovery device has been under constant operation and examination will show about a year's accumulation of residual matter. A scratch-mark calendar has been kept on the wall of the lifeship, and daily it has been added to. That is important since the wall will show more oxidation in the scratches made a year ago than the ones made recently. The accumulators of the ship have been run down as if in service while you were forcing the little ship into its orbit, and the demand recorder shows how the drain was used. The lights in the ship have been burned, and the deposits of fluorescent material in the tubes have been used about the calculated number of hours. Books have been nearly worn out from rereading and they were used with fingerprint gloves though they were studied by us. Instruments and gadgets are strewn about the ship in profusion, indicating the attempts of an intelligent man trying to kill time. Also you will find the initial

findings on the energy collector we used in conjunction with the light-shield.

"Now, yourself. Into your body we will inject the hormones that occur with fear and worry. You will not enjoy a bit of atmosphobia, but believe us, it is necessary. You will have the appearance and attitude of a man who has been in space alone for a year, and luckily for you, you are a spaceman and inured to the rigors of space travel so that it will not be necessary to really give you the works in order to make you seem natural.

"As a final touch, both for our safety and yours, we will inject in your body a substance far superior to your anti-lamine. This is not destroyed by electrolysis, but only by a substance made from the original base. This will protect you against any attempt to make you talk. As long as it is your will, consciously or subconsciously, our secret will be kept. Is there anything we may have overlooked?"

"One thing. The space tan."

"That you will get before you leave."

"Then that sounds like the works."

"It is. Guy Maynard, we wish you the best of luck. We are all sorry that you must leave, but it is best that way. Sooner or later you would become homesick for the things you knew on Terra. Ertene will not last in your memory, we have been careful not to let you indulge in anything that will leave memories either pleasant or unpleasant, and forgetting is easy when the subject was uneventful. Farewell, Guy Maynard."

"Good-bye. And if you ever decide whether your way is at all questionable, have someone look me up. I'll be around Sol."

Terokan laughed. "And if you find that Sol changes her way of living, you may see if you can find us!"

Charalas smiled: "No need. They will not. This is farewell forever, Guy. Good luck."

It was little more than an hour later that Guy Maynard, inoculated with all kinds of shots, was lifted into the sky in a heavy spaceship and on the way for a predetermined section of the Solar sky.

They left him, a couple of weeks later.

And Guy Maynard was headed for Terra in a broken lifeship saved from the derelict of the Mardinex. He thought of Ertene briefly, and then put the thought from him. He would never see Ertene again.

But the things he had in his mind would make Ertene's influence everlasting over an unknown Terra. That alone made the contact worth while.

Guy Maynard stumbled upon another thought. He had accused them of going on forever like an itinerant, taking nothing and giving nothing and living sterile as far as their good toward civilization. He was wrong, and now he knew it. Ertene did not go on her lonely path. She had strewn the fruits of experience in Sol's path as best she could and still maintain safety for

herself. It was reasonable to suppose that Ertene had done the same things for those other systems.

Hers was not a useless existence. Ertene was doing as much for civilization as Terra, surely.

And though he would never see Ertene again, his own personal gain from having been to Ertene would cause him to remember the wanderer. And even though Terra would never know of Ertene's existence, she would benefit from their experience.

Ertene—completely altruistic.

Or was she completely selfish?

Terra would never know.

V.

Ben Williamson sat bolt upright in his chair and listened to the faint piping whistle that came through the communicator along with the sounds from the communications office. Te snapped the button calling for silence in order to hear better, and then scratched his head in wonder.

"Executive to Communications and Pilot: Tune in that signal better and get a fix on it. Prepare to follow the fix."

"Received," came the laconic reply, and then the less formal: "What's in the sky, Ben?"

"Whether you know it or not, that signal was Guy Maynard's private sign."

"I thought so," said the communications officer. "I wasn't certain."

"We'll not court-martial you for that," laughed Ben. "After all, you didn't know Maynard personally."

"Right. I didn't know him at all. But this fix—I've got it."

"Can you get range and possible track?"

"Fairly well." There was silence for several minutes and then the communications officer announced the figures concerning the distance and probable course constants of the emitting source.

"Executive to Technician: Jimmy, have you got the cards on the *Mardinex* or did we put them in the morgue after we slipped her the slug?"

"Still got 'em. BuSI thought we should keep 'em a bit just in case. After all, the *Mardinex* was a secret proposition and to remove her cards from the Terran cardexes would be like the guy in that story."

"Which guy in what story."

"The fellow who suspected his neighbor of stealing his chickens just because he found the neighbor garbaging chicken feathers and chicken carcasses. They've made no announcement of the *Mardinex's* failure to return. To have Terra toss away the information that we have so painstakingly gathered concerning her most intimate features would be almost an open admission that Terra is not longer concerned about the *Mardinex.*"

"They couldn't prove a thing."

"No, but as the Chinese say: 'A wise man does not stoop to secure his shoes in a melon patch nor adjust his hat under a cherry tree.' They could trump up enough evidence to arouse their people if they could prove our disinterest in some

concrete manner. As it is, the whole system knows that Terra still carries the cards of the *Mardinex*. That's the one thing they've ascertained. We've got 'em all right."

"Good. Then as soon as we get close enough to that source, and the spotters take hold, run the constants through the cardex."

"Good Sol, Ben. What do you expect?"

"Dunno. Couldn't be the *Mardinex*, of course. That couldn't possibly be here and now. But—that was Maynard's sign and he may have survived in some queer manner. We know that the *Mardinex* carried lifeships."

Time passed as the destroyer accelerated constantly, reached turnover, and began to decelerate toward the suspected position of the signal-emitting object. Just after turnover the spotters took hold and announced that the object was capable of being scanned and analyzed.

The whirr of the file as the cardex ran through the thousands of minute cards filled the technician's office and came through the open communicator. Then the attention bell tingled once, and the card that matched the constants of the emitting object was slid from the file into a projector. The micro-printing above the cardex pattern was projected on the ground glass above the instrument and the technician read it off in a flat voice.

"Fore lifeship—standard type from Martian space craft of the *Mardinex* class. One of six similar models placed in the upper quadrant of the ship. These ships are capable of four gravities, Terran, and are capable of making the one hundred million mile trip. No armament as per agreements under the Eros Conference. Will accommodate thirty passengers for a period of ninety days, Terran without discomfort other than atmosphobia and the possibility of avoirduphobia if the distance demands free flight for any period of time. Equipped with spotter equipment and signaling equipment capable of reaching interested searchers but not raising those whose equipment is nondirective or whose directive equipment is pointed away from the emitting source. Also equipped with complete spares for signaling equipment—"

"That's enough," said Ben. "Executive to Turretman: Trim your autoMacs and load the torpedo tubes. This may be a trap."

"Right," said Tim. "And according to Jimmy, they may be trying to see how we react after a sign of the *Mardinex*'s lifeship pattern. They're capable of duplicating that pattern, you know."

"We're going in there to win or lose," said Ben soberly. "No matter how they take it, we're ready. Tim, put a remote arming fuse in one torp and launch it right now. If this is trouble, we'll butter our chances. If this is not trouble, we'll keep the arming signal running and retrieve the torpedo. Right?"

"Received. Want it set to remain inert as long as the arming signal is on?"

"That's the order."

The destroyer bucked slightly and Tim said: "She's off. Any time anybody thinks we should let her roar, poke the arming button on the panels."

Instinctively, Ben Williamson glanced at the minute pilot light that gleamed faintly just above a button on the ordnance panel. It was the left-most button of a row of twenty. By reaching out of his chair with the right hand and leaning back so that his spine was arched deeply, Williamson could touch the arming control. He nodded, and as he watched, the panel below winked on, indicating that the turret was ready for action. Beside it, the winking lights indicated that his orders to load up the torpedo tubes had been conveyed to the tube crew. A string of varicolored lights indicated a series of interferers and space bombs that were being armed in the bomb bay. Williamson smiled. Tim Monahan was an excellent ordnance officer; one who rode the turret himself and directed the fire controls from there.

"Executive to Pilot: What's our position?"

"Twenty minutes from object."

"Ring the Action Alarm. Who knows—we may see action!"

"Turretman to Executive: Object sighted. Definitely a lifeship. Doesn't look dangerous. Shall we take a chance?"

"Executive to Communications: Answer 'em on their band."

"Received. Ben, they went off the air as soon as I opened my transmitter." There was some period of silence. "Communications to Executive: Identifies himself as Guy Maynard. Says alone and safe. Cut emitter to prevent curiosity on the part of Martian observers who may be listening."

"Good fellow. He should be an Intelligence Officer. Tell him to prepare for transshipping."

"He says that after a year in that sardine can, it can't be too quick. Want him to jump?"

"Can he put on any speed?"

"His suit is still in partial operation. He can rev up about a G."

"Tell him to dive. We'll scoop him without trying to match speed."

Guy smiled vaguely. He made one last prayer that he could look as starved for company as a man would after a year in that tiny ship. He didn't stop to wonder why they'd asked him to dive. He merely prayed that his story would be acted as convincingly as his forged diary read. He'd partially committed that to memory; certain lapses would be expected. It was good and it contained several references to ideas for equipment which would help explain his sudden inventive streak. He hugged the volume to him and dived out of the open space lock. Once free of the ship, Guy turned the tiny driving fin on and he stood upright on the soles of the spacesuit shoes.

And minutes later the destroyer arrowed silently past and a silent, invisible tractor reached out and caught him in the focal area. It stretched like a thin elastomer cord, invisible, and it accelerated him gently as the destroyed sped on. He

caught up with the destroyer and was taken aboard just as the soundless gout of flame far below marked the end of the lifeship.

"Why?" he asked patiently, shortly and tersely.

"Didn't care to leave any evidence for the Marties."

"Sort of got attached to it," said Guy.

"Could be, but one sight of that anywhere in the Solar System would mean trouble. Evidence from the *Mardinex*, you know. Forget it, Maynard. You're far more important. What happened, and how, and why?"

Maynard looked pained.

"Forget it, Guy. Obviously you had a tough time. Take your time about telling us. What do you want most?"

Guy smiled shyly. "I thought about that a lot," he said slowly. "I wanted steak and potatoes. I wanted cigarettes. I even thought of Laura Greggor. I wanted . . . Ben, I want everthing, and in mass-production lots."

"Steak and potatoes we can give you. Cigarettes we have in plenty. A shower and a shave and a soft, well-made man-sized bed. Books and pictures and a dollop of liquor, too. Candy, cigars, chewing gum, et cetera. But the only female we have on board is cooky's pet hen. Like a fresh egg?"

"Anything as long as it is not lonely," said Guy. "My throat is slightly lame."

"I can imagine. Well, it's sick bay for you and we'll wait on you. And—Guy, there'll be plenty of company." Ben snapped the general communicator button and said: "Executive to crew: Junior Executive Guy Maynard is aboard. He is to be shown every consideration, and it is directed that each watch appoint three roving spacemen whose duties will be to replace crew members who will visit Maynard. His stay in sick bay is not quarantine."

"Williamson, I'll take that shower now. And then the steak. Got a cigarette?"

As Maynard ignited the cigarette, he thought: Carefully prepared evidence! How painstaking they were! Even the scratches on the wall made so that the earlier ones would be made first. The millions of fingerprints. And destroyed because it would be bad evidence against us. Ironic. And yet—they might have missed something. And supposing Williamson hadn't armed that torpedo but had taken the crate in to Terra instead? Then Ertene's evidence would have been needed. We couldn't have known—

"Now for that shower," he said to Ben. There was no use in deliberately thinking of Ertene now. Forget it. To Ben he added: "Might run through that log of mine. Gives you the story pretty well, and my voice-box is still unused to talking much. I'm going, but I'll be back."

"Good thing you kept a log," said Ben. "It'll be most valuable evidence for the investigation."

Investigation! Guy hadn't thought of that factor. Naturally he must give his evidence before a court-

martial, though he would by no means be on trial. Yet, they were thorough and he prayed that he wouldn't make the most unnoticed slip. They'd ply him with questions and watch his answers. He was glad that he hadn't memorized the log by rote. To repeat word for word certain parts would be expected, and to miss completely other parts would be expected. There would even be parts he had forgotten and parts too doleful for the mind to keep fresh.

Then Guy Maynard put it all aside. He forgot his troubles and his worries, and gave himself up to the luxuries of civilization once more. His act was most convincing. He ate with relish and smoked until his throat was sore. He was reticent at the right time, and he made it appear as though it had become habit with him to remain silent; and also brought out the fact that his larynx was slightly unused to exercise. He was glad to be home, though he deplored the destruction of his lifeship—he spoke of it affectionately sometimes—other times he outwardly hated the thought of it—because there were some experiments uncompleted on it. They could be duplicated from the log, of course, but the originals were priceless in his estimation—

And then the reaction really set in. Guy Maynard was home again. Home, to Guy, was the ever-changing orientation of the starry sky and the never constant gravity. He fingered the ordnance controls on the destroyer with affection and realized that Ertene was long ago and far away, and that his place was here, and that his life was geared to the quick life of a spaceman in the Terran Space Patrol.

Peace was wonderful, of course, and at the time he wanted it desperately. But now he realized that the excitement of living in a system of planets offered more than the placid existence of Ertene with its one moon and the occasional space trip.

In spite of the treaties and acceptance of peaceful measures made on the part of the Martians, there was always the chance that some underhanded move might be made. There was that edge to life; that fine, razor-sharp edge of excitement and danger. Mars might make untoward moves, but it was not all Mars' party. Terra made her own espionage and operations tended to display her might to the Red Planet. Brushes that never reached notice were always going on.

He permitted himself to wax enthusiastic over his being home again. They never knew that it was not merely the release from space loneliness but a return from a too long, too uneventful vacation.

He considered himself objectively one day after he found himself looking forward to the return to Terra. The investigation did not bother him; it was the question of whether his year of absence from the service would cause him a year's loss in advancement. If it caused him no loss, he would become a Senior Executive within a month or so after his return. That would give him

the right to captain a destroyer like this one.

His interest and anxiousness to return to Terra had become honest. On Ertene he had argued against it. Now he knew his mind and also knew that Charalas had done the proper thing. He would not have remained on Ertene. Some day the everlasting peace and quiet would get him, and then there would have been trouble.

He owed them his life, and if some of the things in his log worked to his own satisfaction, he owed them more than that. He'd keep their secret; denying Terra the right to exploit Ertene was hard, but better deny them that than to deny them the knowledge he had gained. Terra would hold dominance over the Solar System without Ertene's presence; though it was not without Ertene's help.

Poor Ertene. A sterile, placid life that was beginning to look pale and uninteresting against the rugged, boisterous existence of men who roamed the Solar System.

Let them have their stability. What was their history? A few thousand years since the dawn of their written lore? Far greater than Sol's though he had been loath to tell them that. At that time such an admission was like admitting that one was but an adolescent. But it was true. But in those thousands of years, had their science come a comparable distance with Terra's?

And Guy knew why. With nothing to strive against, progress ceases.

He wondered whether the investigating committee would make an issue of the fact that a junior executive had been so oblivious to his duty as to permit capture by Martians. That was the only fly in his ointment, the only point over which he worried. He felt that his capture could have happened to anyone, and secretly he admired the bold stroke in the light of how daring it had been for Mars to storm the very ramparts of Sahara Base.

But investigating committees are strange things and their decisions are often based on theory instead of action with no regard to circumstances.

That one minor point continued to worry him at times.

And then the destroyer dropped out of the sky onto Sahara Base, and Guy Maynard stooped to pick up a handful of the soil of Terra. He shook it in the sky and rubbed it into his hands. He smelled of it and exhaled deeply. Then, still holding a bit of it, he faced the sector commander who was waiting for him in the command car.

The commander smiled curtly and said: "Junior Executive Maynard, you are to speak to no one. You are technically not under arrest, nor are you to be placed in that light. However a violation of the order to discuss nothing with anyone will lead to arrest."

"How long is this quarantine going to last, sir?"

"Not too long. The Board of Investigation will convene tomorrow. At that time we will decide your future."

Maynard entered the command

car and they drove off silently. He was thinking: One more hurdle. If I can make it—

His dreams were troubled that night. There was nothing definite about them; they were kaleidoscopic in nature and Charalas whirled in and out of them along with Greggor of the Bureau of Exploration and Laura Greggor. In these dreams he was the central figure; a pitiful, unarmed being that could not strike back against the pointed questions that they hurled at him. He was mired in a black mess of intrigue that would follow him forever. And only by living in constant guardedness would he be safe.

For once the hurdle of the investigation was passed, there would be no recanting.

God help him if after he perjured himself they found out that his tale had been designed to cover a definite breach of his own oath.

It was the price he would pay for the success that Ertene's science would bring him.

Yet he knew that if he continued as he had started, he would be all right. To be convincing in a lie, he knew that the first problem was to convince himself.

And so Guy Maynard went into the Board of Investigation almost self-convinced that his year of loneliness was a fact.

He didn't dare consider the future if he failed to convince the Board. Not only for himself, but for Ertene and Terra both. They—he dropped the awful possibility there. He stiffened his resolve and thrust the thought from his mind. There must be no slip.

So with a part of his mind fighting to keep from viewing utter chaos, and another part of his mind telling him that he was hiding his head in the sand like an ostrich, Guy

Maynard entered the large room with the silent, waiting men.

He swallowed deeply as he noted the weight of the platinum braid and he took his appointed position with a qualm of misgiving.

VI.

Guy Maynard's eyes swept about the room and saw eyes that were quiet, and if they were not openly friendly, at least they were neither hostile nor doubtful. The Board of Investigation was composed of several high officers and a civilian. He glanced at the neat pile of papers that were placed on the table before his appointed position and glanced through the names of those present, wondering about the civilian; most of the officers he knew by sight.

He nodded to himself; the civilian was Thomas Kane, a news publisher, and therefore quite natural a presence in this investigation. The fact that he was the publisher himself, and not one of his hirelings gave the investigation the air of extreme secrecy, and Guy understood that whatever went on in this gathering today would be held in the utmost confidence until the necessities of living made the publicity of the conference desirable—if ever. The public would accept the word of the publisher with more credulity than they would a prepared statement issued for common consumption by a propaganda department.

People had become used to normal propaganda, and were capable of picking it out and disregarding it. A publisher's own statements were considered to be noncontrollable since the only recourse that any Patrol investigation could take was to bar the publisher from their subsequent conferences, and to combat that the publisher could make things literally warm for any body of Patrol officers who tried to muzzle him.

The chairman, Patrol Marshal Alfred Mantley, rapped for order, and started the proceedings by telling Guy: "We have been in order for three hours, during which time we have considered the evidence presented by the log of your . . . er . . . journey. Also, the log has been read and digested by professional readers and pronounced authentic. The latter is not so much in defense of you, Maynard, as it is to assure us that you have not been or are not now acting under duress. You present us quite a problem, young sir. Quite a problem. Coldly and cruelly, we would find our lives less complicated if you hadn't returned," he said with a laugh. "But you are here and we are glad to have you returned. You have had quite an experience—one that is seldom enjoyed and only recorded a few times in the annals of the Terran Space Patrol. How are you feeling?"

"Quite all right."

"Fine. Now, Guy, tell us in your own words a brief account of your travels."

Guy got as far as the encounter with the Martian when he was interrupted by Patrol Marshal Jones. "How do you account for the fact that a Martian was able to penetrate

to the very heart of Sahara Base?"

"I have no idea, sir. I, like the rest of us, have been led to believe that our security in the Base was perfect. Naturally I was not armed."

"No," said the chairman. "And had you been armed, I doubt that the encounter would have been different. Fighting unarmed against a Martian who is holding a MacMillan at the ready is not considered the kind of thing that any intelligent man would attempt. The fault lies with the security office, not with you."

His chief, Greggor of the Bureau of Exploration asked: "Is this an official decision? I want it made clear that my assistant is not responsible for his trouble."

"Maynard is not to be held responsible. When the word came via Senior Executive Williamson, the investigation of the kidnaping act disclosed that the blame—if any—was to lie with Security. Off the record, I can not see how any security bureau could cope with such boldness. It was born of desperation and bred of terror—and it died for lack of sheer weight and velocity."

"Thank you," said Space Marshal Greggor.

Guy went on, telling his partly-memorized tale, until he was again questioned.

"You hadn't felt the brunt of the electrolysis before the *Mardinex* was attacked?"

"It had just started. The final explosion broke my straps and destroyed the electrolysis equipment."

"And you couldn't make your way to a lifeship at that time?"

"I did as soon as I came to, and realized that I was alone. The least damaged lifeship required repairs that were completed several hours later. By that time we were passing through the midst of Martian territory and I thought it best to lie low."

"You preferred to take the chance of orbiting rather than running the Martian gauntlet?"

"Orbiting was no chance, sir. Running the gauntlet would have been sheer suicide since the Martians were extremely interested in the *Mardinex*. They had most of their grand fleet out watching. Only my velocity—which prevented any attempt to stop me—and my acceleration—which prevented any attempt to try to match my speed—got me past safely. I am certain that they put a pointer on me as we went past."

"By what reasoning?"

"I would have done it, sir, if the cases had been reversed."

"Naturally," said the chairman. "Proceed, Maynard."

"Knowing that any deviation of the *Mardinex* or electrical activity aboard would register at the Martian detector stations, at least until we were out of safe range, I proceeded to make the lifeship as spaceworthy and as comfortable as I could. I took plenty of spare equipment—"

"Of what sort?"

"Sheer gadgetry, sir. I've had a few ideas, and this looked as though

I'd have plenty of time to try them out. I powered the lifeship far beyond her normal power because I had to get back home from a ship leaving the System at better than ten thousand miles per second."

"In order to bring out the resourcefulness of my assistant," said Greggor, "I want the record to state that he prepared for the boredom he knew would come."

"It is recorded."

"Then, as soon as we were beyond the longest possible range of the most powerful detector-analyzers, even when aimed by a pointer, and taking into consideration that Mars might have had an observer out about even with the orbit of Pluto, I emerged from the derelict and began to decelerate."

"Good."

"Well, that's about all," he said. He felt that this was it. He was worried that the deeper discussion might bring forth errors and contradictions, and he wanted them to lead him into the initial disclosures rather than to have them add to a statement that might be straining at the truth already. "I slept. I worked. I did about everything a man can do when he's sitting in a lifeship for a solid year waiting for his home planet to come close enough to signal to. This is the hard part. Nothing of any importance happened. One hour was like the rest. I slept when I got tired and worked until I tired of it. I ate when hungry. I shaved when my beard got uncomfortable. I probably have attained a number of bad habits during my enforced hermiting, but they will be easily broken."

"Your record is quite clear," said Chairman Mantley. "Is it the agreement of this investigation that Guy Maynard's story be accepted?"

"I see no reason why it should be disputed."

"What purpose would Maynard have in lying?"

"It is truthful enough for me."

"I'm in accord."

"Let's drop this foolishness," said Kane, the publisher. "What is far more important is the public explanation for Maynard's absence."

"Our friend of the Fourth Estate is correct," said Mantley. "The log is accepted, and will be maintained in the archives under secret classification." He smiled at Maynard. "Now, young man, you force us into developing a year-long cock-and-bull story for the public."

"Sir? I don't understand."

"If you breathe a word of that story to anyone else, you'll be the direct reason for an Interplanetary War—with capital letters."

"But—"

"So it's the truth. You'll learn, young man, that there are times when the truth is not always the best. You are all right, alive and well—to say nothing of being equipped with a few brilliant ideas for your trouble. Your captors are dead and gone. Mars doesn't really know what happened to their *Mardinex*, and Terra doesn't really know anything about the incident. You can't be court-martialed for being Absent Without Leave for we need you and your ideas. You haven't

been spacewrecked, for no ship is missing."

"How was my absence explained?" asked Guy.

"You were M-12."

"Oh?" said Guy.

"Then it's easy," said Greggor. "Has his first contact been reported yet?"

"No. I see your point. Certainly. Funny, it never has happened this way before and now that it did, I forgot the reality."

"As an M-12 case, he can make the one-year mention in his own right. It will also tend to authenticate other M-12 cases which must be false. Then after the third year —if he hasn't been returned to full duty already—he can make the third-year mention. But instead of decreasing the mention, Guy will increase it."

"Providing it is necessary. After all, we are not trying to establish a fade-out for a man killed in an incident that might lead to total war. This time the man has returned."

"How can we strengthen this contact?"

Kane spoke up cheerfully. "From the stuff in his log, I'd say that the best way would be to promote him a rank for service above and beyond the requirements of his present rank. It will also permit him to skipper a destroyer or lighter craft which was denied him by the Junior Executive's rank. I'll plant his picture in my news sheet with a vague reference to the fact that Guy Maynard has been engaged in experiments at a secret place and that his initial experiments have been so successful that he is being given the command of a small laboratory ship in order that the experiments may be tested in the prime medium."

"And then?"

"Marshal, there is nothing that sounds like truth than a lie liberally sprinkled with truth. In fact, I'd say the latter sounded even better than truth."

"Truth? Is there any in this story?"

"Maynard," asked Kane, "you said that some of these things were partially assembled and tested in that lifeship?"

"Yes. It is deplorable that they were completely destroyed."

"Not too deplorable," said Marshal Warsaw wryly. "After all, the evidence was pretty bald-faced."

"Well, his story about working in a secret laboratory is not too untrue, is it? What could have been more secret than his position? Gentlemen, no one but he knew where he was! And some of the experiments were eminently successful, were they not?"

"I believe so."

"Then his statements warrant the trust of this assemblage. What do you say, gentlemen?"

"Sounds reasonable," said the chairman. "Any dissent?"

There was none.

"Furthermore," said Kane, "I'd suggest that you have professional writers copy his log and convert it into a day-by-day account of his experiments. Use it as close to the real thing as possible so that he won't have to memorize too much. Then destroy this original."

"Excellent," said Patrol Marshal Mantley. "Maynard, you may think this cold-blooded. No doubt you want revenge. I'd want it, I know. But we're all satisfied, here. You are back, and the Martians lost their battlecraft."

"It does sound brutal," said Maynard. "And very depressing. But I do suppose that one man's loss against the loss of a heavy space craft and a partial crew can not be argued. I'll accept it."

"Then," said Mantley, "this Board of Investigation is closed and the recommendations will be followed. Maynard, your rank will be increased immediately, and until we can commission a small laboratory ship for you, you are released from active duty. You will remain in touch with this office, for you will be needed from time to time to sign papers and to requisition the materials you will require to complete your experiments. As soon as our writers have been able to copy your original log, the Bureau of Science will check it over and decide which of your experiments will be completed."

"Will I be able to work on the rest of them, sir?"

"That depends. You will probably be called upon for consultation since you developed them. But we cannot overlook the urgency of some of these."

Space Marshal Greggor came over to Guy and placed an arm over the young man's shoulders. "That was quite an experience, Guy. Far beyond the experiences of most men. I am sorry for myself, and happy for you. You'll be coming to the house?"

"As soon as I can get settled, sir. Possibly tonight."

"Excellent. I'll prepare Marian and Laura—they think you're a real M-12."

"Will it be a shock?"

"Somewhat. They aren't too certain of the M-12 business; though they do not know the blunt truth, they are aware that few men classified under the M-12 are ever heard of again. That's because they're close to the Service. M-12 is a brilliant method of permitting a man to drop from sight, since it was designed to permit a man to leave his friends gently—the so-called contacts are made by telegram and personal messenger to remove certain portions of the man's effects and to pay his rent and so on. Eventually all of his stuff is gone, his friends wonder where he is and eventually forget him.

"But your return will put faith in M-12 again. They'll both be glad to see you."

"You must do me a favor," asked Guy earnestly. "Please explain to Laura about my leaving without saying good-bye."

"I'll do that. M-12 is the roughest on the ones who are close without being blood relations. We'll smooth it over. Now take it easy. Hello, Kane," he said looking over Guy's head. "Are you sorry we deprived you of a story?"

"Some day this young man will make me a better one," laughed Kane. "Drop up to the office to-

morrow if you can. I'll buy lunch —you deserve some special treatment to pay for your year of— experimenting. He'll be safe," said Kane to Greggor.

"I know it," said the Space Marshal. "You wouldn't be permitted the inside Council unless you were proven, you know."

"I'll do more," said Kane. "I'll have one of my boys run over the forged log for you. He can make it sound a bit more authentic. I've always thought that your logs and diaries were a little stiffish. A bit of yearning and youthful hope would lend that log a world of reality, it having been written by a lonely young scientist."

"That's a deal. Well, take it easy. And we'll see you later."

Guy Maynard arrived to find his room in order as according to the treatment given M-12 cases. He walked around the room and inspected everything there, finally dropping into the easy-chair to think. It struck him, then. For a moment he was thoughtful, and then the humor of thé situation hit him like a blow.

For Ertene had prepared a world of painstaking evidence to support his tale of suffering and trouble. They gave him every bit.

And for their trouble on the lifeship, it had been destroyed without inspection because of Terran fear of discovery. Not that Terra was concerned about reprisals, but just because Terran ideas of exchange dictated that they should let a matter drop after they had received the better of the argument.

And then his story. Had he memorized that log day for day and word for word, it would have been of no use. He was ordered to forget it in every detail save those "ideas" he was supposed to have had.

How neatly had the Terrans destroyed every mite of Ertinian evidence.

All expect the scientific side.

And Ertene would roam on through the Galaxy in utter silence, having scattered the seeds of advancement upon fertile ground.

Ertene's life was not in vain.

TO BE CONTINUED.

TEST SIGHT TASTE RIGHT
If the ladder is placed against building, how far up will it reach?
ANSWER
It will reach exactly to the top of the building.
PEPSI-COLA
5¢
12 OZ. BOTTLE

Tricky Tonnage

by MALCOLM JAMESON

Tricky indeed. A very neat system of cheap transportation it made, too—but it led to some slight difficulties with rocks that floated and roads that sank!

Illustrated by Kramer

When you've lived across the fence from an amateur inventor, you come to expect anything. When the wind was right we used to get some of the awfullest chemical stinks from the Nicklheim barn, and we got so used to hearing explosions that they didn't bother us any more than automobile backfires. We just took it for granted when we'd see Elmer, the boy next door, walking around with his eyebrows singed off and the rest of him wrapped up in bandage.

When Elmer was a little tad, he was a great enthusiast for scientific fiction. You hardly ever saw him unless he was lugging some Jules

Vernian opus around, and he ate up all he read with dead earnestness. With that yen for science it might have been expected that he would shine at school, but it did not work out that way. He wouldn't go along in the rut laid out for the run-of-the-mine student. The physics prof finally had him kicked out for some crazy stunt he pulled with the school's equipment. Elmer hooked it all together in a very unorthodox way, and the resulting fireworks was quite a show.

Being barred from school did not faze Elmer. He rigged up his own lab in the barn, buying the stuff from mail order houses with money he made doing odd jobs. Some of the people in the town thought the boy might go places; most simply thought he was a nut. I belonged to the former group, and sometimes helped the kid with small loans. Not many of his inventions panned out, but he did sell one gadget useful in television to a big company. In a way it proved to be a bad thing he did. The company bought the idea outright and paid promptly, but afterwards for reasons of its own it suppressed the invention—an act that irked Elmer exceedingly. It prejudiced him violently against big corporations as such and the whole patent set-up in general. He swore that after that he would keep all his discoveries secret.

About that time his father died, and it looked as if Elmer had finished with his scientific dabbling phase. Overnight he seemed to mature, and after that he was seldom seen pottering around his barn. He was busy about town, carrying on the little one-horse trucking business bequeathed him by the old man. His truck was one of those vintage rattletraps that appear to be always threatening a make the legend of the one hoss shay come true, but Elmer was a fair mechanic and somehow kept the old crate going. Not only that, but to the astonishment of the citizenry, he seemed to be making money at it, and that at a time when rate competition was keen and gas expensive and hard to get. I was beginning to think we had witnessed the end of a budding scientist and the birth of an up and coming young business man. It was Elmer himself who disabused me of that notion.

One morning he stopped his truck at my gate and came up onto the porch. He pulled out a wad of bills and peeled off a couple of twenties.

"Thanks," he said. "It was a big help, but I'm O.K. now."

"Oh, that's all right," I said. "There was no hurry about paying it back. But I'm glad to see you're doing well in the hauling game. It may not be as distinguished as getting to be known as a big shot scientist, but at least you eat."

He gave me a funny look and sort of smiled.

"Hauling game, huh?" he sniffed. "I'd never thought of it that way. I don't cart stuff around for the fun of it, or the money either. That's incidental. What I'm doing is testing out a theory I thought up."

"What's that one, Elmer?" I

asked. I had heard a lot of his theories, first and last, and seen most of them go flop. Elmer had a very screwy approach to the mysteries of nature.

"It's about gravity. I've found out what it is, which is more than anybody else since Newton has done. It's really very simple once you know what makes it."

"Yes," I agreed. "That is what Einstein says, except that he hasn't finished his universal field formula. So you've beat him to it?"

"Yes. I've been running my truck by gravity for the last three months."

That didn't quite make sense to me. The country round about was hilly and a lot of coasting was possible. But still a vehicle couldn't coast up hill. Elmer was studying me uncertainly, and I realized he wanted to talk to somebody, but he was always so cagey about his projects that I hesitated to come right out and ask.

"I've discovered something big," he said, soberly. "So big I don't know what to do with it. I'd like to show it to somebody, only—"

"Only what?"

"Oh, a lot of reasons. I don't mind being laughed at, but I'd like to keep this secret for awhile. If the other truckers found out how I'm doing what I do, they might gang up on me, smash the truck, and all that. Then again there's no telling what somebody else might do with my idea if they got hold of it before all the theory is worked out."

"I can keep a secret," I told him.

"All right," he said. "Come along and I'll show you something."

I got in the truck with him. He stepped on the starter and the cranky old engine finally got going, though I thought it would shake us to pieces before it made up its mind whether to run or not. Then we lurched off down the road, rattling and banging like a string of cans tied to a mongrel's tail.

"Where does the gravity come in?" I asked.

"I don't use it in town," he said. "People might get wise to me."

We went on down to the oil company's bulk station. It had been raining off and on all week and there was a good deal of mud, but Elmer skirted the worst puddles and we got up to the loading platform all right. It was there I got my first surprise. A couple of huskies started loading up that truck, and when they were through I would have bet my last simoleon Elmer would not get two miles with it. There were six big barrels of grease, weighing four hundred pounds each, a half dozen drums of oil, and some package goods. The truck kept creaking and groaning, and by the time the last piece was on, its springs were mashed out flat as pancakes. It was bad enough to have that overload, but the stuff was for Peavy's store out at Breedville—forty miles away over as sketchy a bit of so-called highway as can be found anywhere in America.

"You'll never get over Five Mile Hill with that," I warned Elmer.

but he just grinned and pocketed the invoices. The oil company agent was looking on in a kind of puzzled wonder. He had used Elmer's delivery service before, but it was clear that he didn't believe his eyes. Meanwhile Elmer got the motor going and we backed out of the yard. There was a good deal of bucking and backfiring and shimmying, but pretty soon we were rolling along toward the edge of town.

Just beyond the last house the Breedville road turns sharp to the right into some trees, and Elmer stopped at a secluded place where there was an outcropping of bedrock alongside the road proper. He killed the engine and got a cable-like affair out of his tool box.

"The first step," he said, "is to lighten the load."

He hooked one end of the cable against the side of a grease barrel and the other he led to the bare bedrock and attached it there. The cable terminated in what appeared to be rubber-suction cups. It looked as if it were made of braided asbestos rope, threaded with copper wire, and near one end it spread out in a flattened place like the hood of a cobra. There was a small dial and some buttons set in that. Elmer set the dial and punched a button. Instantly there was a popping sound as the truck bed stirred, and I saw that it jumped up about

a quarter or half an inch.

"Now heft that barrel," said Elmer.

I did. If there hadn't been another one right behind me, I would have gone overboard backward. I got hold of the top of the cask and gave it a tug, not dreaming I could budge four hundred pounds of heavy grease. But it came away with about the same resistance that an empty cardboard carton would have had.

"What makes weight," explained Elmer, "is gravitons. All molecular matter contains them in various degree. Up to now nobody knew how to extract them. You could only manipulate weight by moving the matter itself. I simply drain most of the gravitons off into the bedrock where it will be out of the way. It's easy because there is a gravitic gradient in that direction."

As an explanation it was a long way from being satisfactory. But there was the barrel, plainly stencilled with its gross weight, and it was now practically weightless. The weight had left as abruptly as a short-circuited electric charge. Moreover, Elmer was shifting his cable from one drum to another, and as he touched each one the truck rose another notch. By the time he was through it rode as high as if there was no load at all.

"I'll use the last one of these drums for power," said Elmer, coiling up his cable and putting it away. Then I saw that he was making a short jumper connection between it and another cable running down under the cab to the hood. He lifted that up and showed me an attachment on the shaft behind the motor. It was a bulbous affair of metal and there were two leads to it. One was the connection to the drum, the other was a short piece of cable that dangled to the ground.

"I call that my Kineticizer," said Elmer. "It is really a gravity motor. It works on exactly the same principle as a water turbine except that it doesn't require the actual presence of the water. The upper cable has more gravitic resistance than the one I use to dump the load. It feeds a slow stream of gravitons to the upper vanes of a steel rotor. They become heavy and start to fall, exerting torque. At the bottom they wipe the ground cable and the moving gravitons simply waste away into the road. Four hundred pounds falling four feet gives a lot of power—especially when you use it all. See?"

Did I? I don't know. It sounded plausible, and anyway Elmer banged down the hood and we climbed back into the cab. That time we started off like a zephyr. There was smooth, silent, resistless power, and the truck being lightened of its load, leaped like a jack rabbit. The gasoline motor was idle. The only noise was the rattling of the fenders and the swish of the air. Breedville began to look more attainable.

After we straightened out on the road, Elmer began to tell me about gravitics.

"It was Ehrenhaft's work with magnetics that got me to thinking

about it. Since he was already doing magnetolysis I didn't bother to go along that line. What interested me was the evident kinship on the one hand between electric and magnetic phenomena in general, and between the strong magnetism of electric fields and iron and the relatively weak magnetism of all other substances."

I kept on listening. Elmer's whole theory of gravitics was pretty involved, and in some spots downright screwy. But on the whole it hung together, and there I was riding along on a stream of moving gravitons to prove it. According to the Elmerian doctrine, in the beginning there was chaos and all matter was highly magnetic. It therefore tended to coalesce into nebulae, and thence into stars.

There the fierce pressures and temperatures tended to strip the basic matter of its more volatile outer shells and hurl them outward in the form of radiant energy. Atomic stresses yielded enormous quantities of light and heat and great streams of magnetons and electrons. In the end there is only ash—the cold inert rocks of the planetary bodies. With the exception of the ferric metals none of that ash retains more than a bare fragment of its original magnetic power. Yet even rock when in massive concentration has strong attractive power. The earth is such a concentration, and its pull on the apple was what woke Newton up.

From that concept Elmer dug into the apple itself and into the atoms that compose it. Mass, he claimed, in so far as what we call weight is concerned, is simply a matter of gravitonic coefficient, a graviton being the lowest unit—one more aspect of the atom. It is the nucleus of a magneton, what is left after the outer shells have been stripped away. The graviton is utterly inert and heretofore locked inseparably in the atoms of the substance to which it originally belonged. If only they could be induced to move, their departure would rob the parent substance of nothing except weight, and by moving pure essence of weight potential energy could be turned into kinetic with the minimum of loss.

"It was finding a suitable conductor that stumped me longest," Elmer confessed, "and I'm not telling yet what that is. But as soon as I found it I built this motor. You see for yourself how beautifully it works."

I did, and I saw a myriad of rosy dreams as well. We took Five Mile Hill like a breeze, almost floating over, thanks not only to the silent drive but to the weightlessness of the cargo. I thought of all the massive mountain ranges just sitting in their grandeur with billions and billions of foot-tons of locked up energy awaiting release. I could envisage hundreds of kineticizer plants around their slopes sending out an abundance of free power. What it did not occur to me to think of was what would happen when those mountains eventually became weightless. What worried me most just then was how the other properties of materials would be affected

with alteration of its natural weight.

"Oh, not much," said Elmer. "The relative weights of duraluminum, steel and lead have nothing whatever to do with their tensile strength. I drained off most of the weight of a pan of mercury and tested it. I found that it got a lot more viscous when it was light, a characteristic that is overcome by its normal heaviness. But otherwise it was still mercury. There is an anvil in my barn that weighs less than a toy balloon. If it wasn't kept clamped to the block it sits on, it would soar and bump against the rafters, but as long as I keep it from doing that I can still hammer iron out on it."

We were nearly to Breedville when it began to rain again. Elmer put up the storm curtains, and I asked him about how Mr. Peavy was going to react at getting barrels of grease that were lighter than whipped cream.

"I'm going to take care of that before we get there," said Elmer.

I found out what he meant when he pulled up under a railroad underpass about a mile this side of Peavy's store. He got out and produced his cable again. This time he attached it to the face of one of the concrete abutments that held up the girders carrying the track. One by one he reloaded the barrels by dead weight sucked out of the abutment and let it run into the containers on the truck. Again the truck body settled groaning on its springs.

"I'm working on a way to meter this flow more accurately," said Elmer with a grin. "The last load out here Peavy squawked like everything because the stuff was light. This time I'll give him good measure. Nobody ever kicks at getting more pounds than he paid for."

Well, there it was—Elmer's stunt full cycle. No wonder his gas and tire costs were less than anybody else's in the business, or that he could set out on a long trip with an impossible load. He had only to reduce the load to zero, using part of it for power, and replenish it at the other end of the line.

We went on to Peavy's, using the wheezy gasoline motor again. No one at the store saw anything amiss when we drove up, and though Peavy was careful to roll each box and drum onto the scale, he made no comment when he found them markedly overweight. He probably figured it was only justice from the short-changing he had had on the delivery before, and on which the oil company had been adamant as to adjustment. Elmer then picked up some empty drums and we started back.

The rain was coming down hard by then, and when we got to the underpass there were several inches of water in it. Elmer stopped long enough to draw off a few more hundred pounds of avoirdupois into one of the empty drums so as to have power for the trip home. He said it was the best place along his route to get needed weight in a hurry.

We started up, but had not gone more than about a hundred yards

when we heard a terrific *swoosh* behind us, and on the heels of it a resounding metallic crash and the scream of shearing metal. The ground shook, and a wave of muddy water swept along the road from behind and passed us, gurgling among the wheel spokes.

"What on Earth?" yelled Elmer, and stopped the car.

What was behind us was not pretty to see. The concrete abutment we had just left had slid from its foundation straight across the road until it almost impinged on its opposite mate. What had been the earth fill behind it was a mass of sprawling semiliquid mud. Sodden by days of rain and heavy with water, the fill had come to act like water behind a dam and simply pushed along the line of least resistance. The now practically weightless retaining wall gave way, since there was only friction to hold it where it should be. The two great black steel girders that it supported lay at an awkward angle half in the pit where the underpass had been, half sticking up into the air.

"Gosh," said Elmer, gazing at the spectacle. "Do you suppose I did that?"

"I'm afraid you did," I said. "Maybe concrete don't need weight for strength, but it has to have something to hold it down."

Well, the damage was done, and Elmer was scared. A train was due soon and something had to be done about it. So we drove on to the first farmhouse that had a phone and sent in word about a washout. After that we went on home, Elmer being pretty chastened.

The days that followed were quite hectic. The more the railroad and public utility commission engineers studied the retaining wall's failure, the more baffled they became. The abutment itself was unmarred in the least degree. There was not a crack in it, and only a few chipped places where the falling girders had knocked corners off. Experts chiseled chunks of it and took them to dozens of engineering labs. The records of the contracting firm that built it were overhauled. The wall was up to specifications and had been thoroughly inspected at the time of construction. The fragments subjected to strains and stresses reacted as they should, having exactly the tensile and compression strength it should have. The mix was right, the ingredients without flaw. The hitch was that the stuff under examination had about the same weight as an equal volume of balsa wood!

Learned treatises began to appear in the engineering journals under such titles as, "Weight Loss in Mature Concretes," "Extraordinary Deterioration Noted in Failure of Concrete Railway Abutment," and so on. Throughout the whole strange controversy Elmer never peeped, and neither did I. I kept silent for several reasons, and only one of them was the fact that I had given Elmer my pledge not to divulge his invention before he gave the word. Mainly I felt that whatever I might tell them would be re-

ceived as too ridiculous to be believed. After all, people just don't go around sapping idle weight from stationary objects.

The sequel to the incident has to remain obscure. The very ride that let me into the secret proved also to be the cause of my being excluded from it thereafter. I caught a cold that day, and before long it turned into pneumonia. Complications followed, and there were some months when I was confined to a hospital bed. When I was out again and around, my neighbor Elmer had gone, presumably in search of wider fields.

It is a pity that Elmer's unfortunate experience with his earlier invention soured him on the usual channels of development, for I think what happened to him later was that he got into the hands of unscrupulous promoters. For quite a long time after the collapse of the railroad crossing I heard nothing of Elmer himself or his world-shaking discovery. But little bits of news kept cropping up that indicated to me that while Elmer's secret was being kept, it was not getting rusty from disuse, though he lacked the necessary business imagination ever to put it to its best uses.

There was the phenomenal success of Trans-America Trucking, for example. It was significant to me that the Eastern terminus of its main haul was laid out in the bottom of an abandoned rock quarry and its Pacific end in a deep canyon. I thought I knew where the power

came from, especially when an oil salesman told me he had tried hard to get the Trans-America contract. They not only refused to buy from him, but he could not find out what company, if any, was supplying them. I also noted that Trans-America was continually embroiled in law suits arising from discrepancies in weights. I knew from that that Elmer had not yet solved the problem of metering his weight siphons.

There were other straws that pointed to Elmer's fine hand. Highway engineers along the routes traversed chiefly by his trucks discovered after a time that even the dirt roads over which the trucks ran needed little or no binder. The surface soil was found to be incredibly heavy, like powdered lead, and therefore did not dust away under high-speed traffic. In the course of time it became as hard and compact as the floor of a machine shop where iron chips form the soil.

But eventually there was trouble. Disloyal employees must have stolen lengths of Elmer's mysterious graviton conductor, for there was a story told in some glee of a policeman giving chase to a fleeing man who had a big iron safe on his shoulders! The burglar got away, so for a time Elmer's secret was comparatively safe. And then there was the exposure of what was later known as the spud racket.

One of Trans-America's ex-truckmen, being aware that potatoes were sold by the pound, saw opportunity. He absconded with a length of Elmer's cable and set himself up in the potato business. He was modest at first. The spuds he handled were overweight, but not too much too heavy when he resold them. The dieticians in the big institutions were the first to notice something wrong, for they had analysts to interpret the figures. But greed got the best of the gangster truckman. Not content with his initial ten or twenty percent boosts in weight, he poured on the avoirdupois thicker and thicker. The average housewife began to complain that big potatoes required all her strength to lift.

The day the market inspectors raided the man's storehouse the cat was out of the bag. They uncovered an endless stream of potatoes on a conveyor belt that ran by a bin filled with scrap iron. As each spud passed a certain point it was wiped by a wisp of mineral wool, whereupon the belt beneath sagged deeply and spilled the potatoes onto the floor. Cranes scooped them up and carried them to the packing department.

The subsequent prosecution ran into a myriad legal difficulties. There was ample precedent for dealing with short weights, but none for artificially added surplus weight. Chemists sought to prove, once they tumbled to the concept of movable gravitons, that the introduction of ferrous gravitons into a food product constituted a willful adulteration. They failed. The composition of the potatoes was no more altered than is that of iron when temporarily magnetized. In the end the

case was thrown out of court, much to the anger of some theologians who had also developed an interest in the case.

That there was at once a spate of laws forbidding the alteration of natural weights was inevitable. State after state enacted them, and the Interstate Commerce Commission began an investigation of Trans-America Trucking, damaging admissions having been made by the potato racketeer. It was the collapse of one of the cliffs at the western terminus of that company that was the straw to break the camel's back. Weight shifting became a federal offense with drastic penalties.

Perhaps collapse is a badly chosen word. The cliff disintegrated, but it did not fall. It soared.

It happened late one afternoon shortly after a heavy convoy arrived from the east. Thousands of tons of weight had to be made up, and the power units of the incoming trucks recharged with still more weight. The already lightened cliff yielded up its last pounds, for it had been drawn upon heavily for a long time. Its stone, being loosely stratified, lacked cohesion, so with sound effects rivaling those of the siege of Stalingrad, it fell apart—*upward*—in a cloud of dust and boulders. The fragments, though stone, weighed virtually nothing, rose like balloons and were soon dispersed by the winds.

Unfortunately the canyon was not far from the most traveled transcontinental air route. Within an hour pilots were reporting seeing what they described as inert bodies floating in the upper air. One of them ran into a stone no bigger than his fist, but since he was making several hundred miles an hour at the time, it neatly demolished one of his wings. That night two stratoliners were brought down, both riddled with imponderable gravel. The debris while lighter than air, still had some residual weight and unimpaired tensile strength.

Congress intervened. Trans-America's charter was voided and its equipment confiscated and destroyed. Elmer was forbidden to resume business except in orthodox lines. There was no place in the United States for his invention.

That should have been the end of the Theory of Gravitics and its unhappy applications. But it was not. For Elmer had associates by that time who had tasted the luxury of sure and easy profits, and they were not to be denied. Rumor had it that it was his shady partners who took over the financial end and relegated him to his lab again to hunt for other means of utilizing his kineticizer. However that may be, the next stage was several years in incubation. For a time gravitons ceased to be news except in scientific circles where controversies pro and con still raged. People had already begun to forget when Caribbean Power announced itself to the world.

It started operating from a tiny island republic known as Cangrejo Key. Through oversight, or be-

cause it was a worthless patch of coral sand frequently swept by hurricanes, mention of it was omitted in the treaty between the United States and Spain at the end of the war of 1898. It was still Spanish until the graviton syndicate bought it from an impoverished Franco for a few millions in real gold. Whereupon the Cangrejo Commonwealth was set up as an independent state and a law to itself.

By then they had one valuable addition to their bag of tricks—Elmer's third great invention. It was a transmitter of beamed radio electric power, and they promptly entered into contracts with large industries in nearby America for the sale of unlimited broadcast power at ridiculously low rates. At first the great maritime powers protested, suspecting what was afoot and fearing the incalculable effects on shipping if Caribbean Power meant to rob the sea of its weight. But the storm subsided when the new republic assured them sea water would not be touched. They pledged themselves to draw only from the potential energy of the island they owned. So the world settled down and forgot its fears. No matter what happened to Cangrejo Key, there was the promise of abundant cheap power, and at the worst one coral islet more or less did not matter. Even if its sands did float off into the sky as had the canyon wall on the Pacific Coast they could do little harm, the Key being well off the air lanes.

It was a premature hope, for they reckoned without the ingenuity of the men behind the scheme. Soon great derricks reared themselves on

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the Key and drills began biting their way into the earth. By the time the holes reached eight miles depth the transmission towers were built and ready. Then came the flow of power, immense and seemingly inexhaustible. A battery of kineticizer-dynamos commenced operating, suspended by cables deep into the bowels of the planet, converting the weight that was overhead into kilowatts which were sent up to the surface through copper wires. There it was converted into radio power waves and broadcast out to the customers. It was good, clean power. Industry was grateful.

How deep the syndicate eventually sunk its shafts no one ever knew. Nor how many millions of tons of earth weight were converted into electric energy and spewed out to the factories of the world. But it took only a few years for the project to revolutionize modern economics. With power literally as cheap as air, coal holdings became worthless and petroleum nearly so. In the heydey of the power boom cities like New York went so far as to install outdoor heating units so that in the coldest of cold waves its citizens could still stroll about without overcoats. There was no point in conservation any more. Old Terra Firma had gravitons to burn.

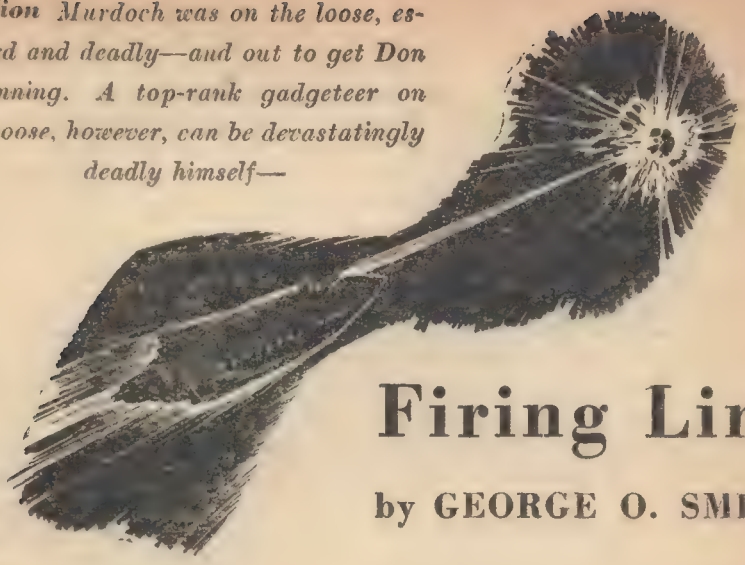
The beginning of the payoff came with the Nassau disaster. The town was flattened by a mighty earthquake, and the attendant tidal wave left little of the Florida coastal cities. When the tremors died down the British Empire found it had added another island of near continental size to its realm. The Bahama Bank had risen above water and then stood from ten to fifty feet above sea level throughout. But there was a rider attached to that dubious blessing. The bed of the Florida Straits had risen correspondingly and the current of the Gulf Stream diminished. Europeans began to worry about the effect of that upon their climate.

Isostatic adjustment was responsible, sober geologists warned darkly. Let the Caribbean Power gang continue to rob that region of its proper weight there would be nothing to hold it down. Adjacent geographical masses would push in to fill the vacuum, just as the underlying, restless, semifluid magma would push up. The time would soon come when mountains rivaling the Himalayas would rear loftily where the Bahama Bank had been and when that day came the other islands about it and the nearby continental areas might well be only shoal spots in a shallowing sea. The Republic of Cangrejo had to go. It was a matter for the new United Nations Court to decide.

Well, that's the story of Elmer Nicklheim's kineticizer as I know it. I am still wondering whether he was with the gang the day the bombers came over and blasted Caribbean Power off the map. If he was, I think he must have been a prisoner, for the gang he at last teamed up with turned out to be an arrogant, greedy lot.

THE END.

***Hellion** Murdoch was on the loose, escaped and deadly—and out to get Don Channing. A top-rank gadgeteer on the loose, however, can be devastatingly deadly himself—*



Firing Line

by GEORGE O. SMITH

Illustrated by Orban

Mark Kingman was surprised by the tapping on his windowpane. He thought that the window was unreachable from the outside—and then he realized that it was probably someone throwing bits of dirt or small stones. But who would do that when the doorway was free for any bell-ringer?

He shrugged, and went to the window to look out—and become cross-eyed as his eyes tried to cope with a single circle not more than ten inches distant. He could see the circle—and the lands on the inside spiraling into the depths of the barrel, and a cold shiver ran up his spine from there to here. Behind the heavy automatic, a dark-complected man with a hawklike face grinned mirthlessly.

Kingman stepped back and the stranger swung in and sat upon the windowsill.

"Well?" asked the lawyer.

"Is it well?" asked the stranger. "You know me?"

"No. Never saw you before in my life? Is this a burglary?"

"Nope. If it were, I'd have drilled you first so you couldn't describe me."

Kingman shuddered. The stranger looked as though he meant it.

"In case you require an introduction," said the hard-faced man,

"I'm Allison Murdoch."

"Hellion?"

"None other."

"You were in jail—"

"I know. I've been there before."

"But how did you escape?"

"I'm a doctor of some repute," said Hellion. "Or was, until my darker reputation exceeded my reputation for neural surgery. It was simple. I slit my arm and deposited therein the contents of a cigarette. It swelled up like gangrene and they removed me to the hospital. I removed a few guards and lit out in the ambulance. And I am here."

"Why?" Kingman then became thoughtful. "You're not telling me this for mutual friendship, Murdoch. What's on your mind?"

"You were in the clink, too. How did you get out?"

"The court proceedings were under question for procedure. It was further ruled that—"

"I see. You bought your way out."

"I did not—"

"Kingman, you're a lawyer. A smart one, too."

"Thank you—"

"But you're capable of buying your freedom, which you did. Fundamentally, it makes no difference whether you bribe a guard to look the other way or bribe a jury to vote the other way. It's bribery in either case."

Kingman smiled in a superior way. "With the very important difference that the latter means results in absolute freedom. Bribing a guard is freedom only so long as the law may be avoided."

"So you did bribe the jury?"

"I did nothing of the sort. It was a ruling over a technicality that did me the favor."

"You created the technicality."

"Look," said Kingman sharply. "You didn't come here to steal by your own admission and your excellent logic. You never saw me before, and I do not know of you save what I've heard. Revenge for something real or fancied is obviously no reason for this visit. I was charged with several kinds of larceny, which charges fell through and I was acquitted of them—which means that I did not commit them. I, therefore, am no criminal. On the other hand, you have a record. You were in jail, convicted, and you escaped by some means that may have included the act of first-degree murder. You came here for some reason, Murdoch. But let me tell you this: I am in no way required to explain the workings of my mind. If you expect me to reveal some legal machination by which I gained my freedom, you are mistaken. As far as the solar system is concerned, everything was legal and above board."

"I get it," smiled Murdoch. "You're untouchable."

"Precisely. And rightfully so."

"You're the man I want, then."

"It isn't mutual. I have no desire to be identified with a criminal of your caliber."

"What's wrong with it?" asked Murdoch.

"It is fundamentally futile. You are not a brilliant criminal. You've been caught."

"I didn't have the proper assistance. I shall not be caught again. Look," he said suddenly, "how is your relationship with Venus Equilateral?"

Kingman gritted his teeth and made an animal noise.

"I thought so. I have a score of my own to settle. But I need your help. Do I get it?"

"I can't see how one of your caliber is capable—"

"Are you or aren't you? Your answer may decide the duration of your life."

"You needn't threaten. I'm willing to go to any lengths to get even with Channing and his crowd. But it must be good."

"I was beaten by a technical error," explained Murdoch. "The coating on my ship did it."

"How?"

"They fired at me with a super electron-gun. A betatron. It hit me and disrupted the ship's apparatus. The thing couldn't have happened if the standard space-finish hadn't been applied to the *Hippocrates*."

"I'm not a technical man," said Kingman. "Explain, please."

"The average ship is coated with a complex metallic oxide which among other things inhibits secondary emission. Had we been running a ship without this coating, the secondary emission would have left the *Hippocrates* in fair condition electronically, but the Relay Station would have received several times the electronic charge. But the coating accepted the terrific charge and prevented the normal urge of electrons to leave by secondary emission—"

"What is secondary emission?"

"When an electron hits at any velocity, it drives from one to as high as fifty electrons from the substance it hits. The quantity depends upon the velocity of the original electron, the charges on cathode and anode, the material from which the target is made, and so on. We soaked 'em in like a sponge and took it bad. But the next time, we'll coat the ship with the opposite stuff. We'll take a bit of Venus Equilateral for ourselves."

"I like the idea. But how?"

"We'll try no frontal attack. Storming a citadel like Venus Equilateral is no child's play, Kingman. As you know, they're prepared for anything either legal or technical. I have a great respect for the combined abilities of Channing and Franks. I made my first mistake by giving them three days to make up their minds. In that time, they devised, tested, and approved an electron weapon of some power. Their use of it was as dangerous to them as it was to me—or would have been if I'd been prepared with a metallic-oxide coating of the proper type."

"Just what are you proposing?" asked Kingman. "I do not understand what you're getting at."

"You are still one of the officials of Terran Electric?"

"Naturally."

"You will be surprised to know that I hold considerable stock in that company."

"How, may I ask?"

"The last time you bucked them, you did it on the market. You lost," grinned Murdoch. "Proving that you haven't a one hundred percent record either. Well, while Terran Electric was dragging its par value down around the twos and threes, I took a few shares."

"How do you stand?"

"I rather imagine that I hold fifteen or twenty percent."

"That took money."

"I have money," said Murdoch modestly. "Plenty of it. I should have grabbed more stock, but I figured that between us we have enough to do as we please. What's your holdings?"

"I once held forty-one percent. They bilked me out of some of that. I have less than thirty percent."

"So we'll run the market crazy again, and between us we'll take off control. Then, Kingman, we'll use Terran Electric to ruin Venus Equilateral."

"Terran Electric isn't too good a company now," admitted Kingman. "The public stays away in huge droves since we bucked Interplanetary Communications. That bunch of electronic screwballs has the public acclaim. They're now in solid since they opened person-to-person phone on the driver frequencies. You can talk to someone in the Palanortis Country of Venus with the same quality and speakability that you get in making a call from here to the house across the street."

"Terran Electric is about finished," said Murdoch flatly. "They shot their wad and lost. You'll be bankrupt in a year, and you know it."

"That includes you, doesn't it?"

"Terran Electric is not the mainstay of my holdings," smiled Murdoch. "Under assumed names, I have picked up quite a few bits. Look, Kingman, I'm advocating piracy!"

"Piracy?" asked Kingman aghast.

"Illegal piracy. But I'm intelligent. I realize that a pirate hasn't a chance against civilization unless he is as smart as they are. We need a research and construction organization, and that's where Terran Electric comes in. It's an old company, well established. It's now on the rocks. We can build it up again. We'll use it for a base, and set the research boys to figuring out the answers we need. Eventually we'll control Venus Equilateral, and half of the enterprises throughout the system."

"And your main plan?"

"You run Terran Electric, and I'll run the space piracy. Between us we'll have the system over a barrel. Space craft are still run without weapons, and no weapons are suited for space fighting. But the new field opened up by the driver radiation energy may exhibit something new in weapons. That's what I want Terran Electric to work on."

"We'll have to plan a bit more," said Kingman thoughtfully. "I'll

cover you up, and eventually we'll buy you out. Meanwhile we'll go to work on the market and get control of Terran Electric. And plan, too. It'll have to be foolproof."

"It will be," said Murdoch. "We'll plan it that way."

"We'll drink on it," said Kingman.

"*You'll* drink on it," said Murdoch. "I never touch the stuff. I still pride myself on my skill with a scalpel, and I do not care to lose it. Frankly, I hope to keep it long enough to uncover the metatarsal bones of one Donald Channing, Director of Communications."

Kingman shuddered. At times, murder had passed through his mind when thinking of Channing. But this cruel idea of vivisecting an enemy indicated a sadism that was far beyond Kingman's idea of revenge. Of course, Kingman never considered that ruining a man financially, reducing him to absolute dependency upon friends or government, when the man had spent his life in freedom and plenty —the latter gained by his ability under freedom—was cruel and inhuman.

And yet it would take a completely dispassionate observer to tell which was worse; to ruin a man's body or to ruin a man's life.

The man in question was oblivious to these plans on his future. He was standing before a complicated maze of laboratory glassware and a haywire tangle of electronic origin. He looked it over in puzzlement, and his lack of enthusiasm bothered the other man. Wesley Farrell thought that his boss would have been volubly glad to see the fruits of his labor.

"No doubt it's wonderful," smiled Channing. "But what is it, Wes?"

"Why, I've been working on an alloy that will not sustain an arc."

"Go on. I'm interested even though I do not climb the chandelier and scream, beating my manly chest."

"Oil switches are cumbersome. Any other means of breaking contact is equally cumbersome if it is to handle much power. My alloy is non-arcing. It will not sustain an arc, even though the highest current and voltage are broken."

"Now I am really interested," admitted Channing. "Oil switches in a spaceship are a definite drawback."

"I know. So—here we are."

"What's the rest of this stuff?" asked Channing, laying a hand on the glassware.

"Be careful!" said Farrell in concern. "That's hot stuff."

"Oh?"

"In order to get some real voltages and currents to break without running the main Station bus through here, I cooked this stuff up. The plate-grilleworks in the large tubes exhibit a capacity between them of about one microfarad. Empty, that is, or I should say precisely point nine eight microfarads in vacuuo. The fluid is of my own devising, concocted for the occasion, and has a dielectric constant of thirteen times ten to the sixth power. It—"

"Great Howling Rockets!" exploded Channing. "That makes the overall capacity equal to thirteen *farads!*"

"Just about. Well, I have the condenser charged to three kilovolts, and then I discharge it through this switch made of the non-arcing alloy. Watch! No, Don, from back here, please, behind this safety glass."

Channing made some discomforting calculations about thirteen farads at three thousand volts charge and decided that there was something definitely unlucky about the number thirteen.

"The switch, now," continued Farrell, as though thirteen farads was just a mere drop in the bucket, "is opened four milliseconds after it is closed. The time-constant of the discharging resistance is such that the voltage is point eight three, of its peak three thousand volts, giving a good check of the alloy."

"I should think so," groused Channing. "Eighty-three percent of three thousand volts is just shy of twenty-five hundred volts. The current of discharge passing through a circuit that will drop the charge in a thirteen farad condenser eighty-three percent in four milliseconds will be something fierce, believe me."

"That is why I use the heavy busbars from the condenser bank through the switch."

"I get it. Go ahead, Wes. I want to see this non-arcing switch of yours perform."

Farrell checked the meters, and then said "Now!" and punched the switch at his side. Across the room a solenoid drove the special alloy bar between two clamps of similar metal. Almost immediately, four thousandths of a second later, to be exact, the solenoid reacted automatically and the no-arc alloy was withdrawn. A minute spark flashed briefly between the contacts.

"And that is that," said Channing, slightly dazed by the magnitude of it all, and the utter simplicity of the effects. "But look, Wes, may I ask you a favor? Please discharge that infernal machine and drain that electrolyte out. Then make the thing up in a tool-steel case and seal it. Also hang on busbars right at the plates themselves, and slap a peak-voltage fuse across the terminals. One that will close at anything above three thousand volts. Follow me?"

"I think so. But that is not the main point of interest—"

"I know," grinned Channing, mopping his forehead. "The non-arc is. But that fragile glassware makes me as jittery as a Mexican jumping bean."

"But why?"

"Wes, if that glassware fractures somewhere, and that electrolyte drools out, you'll have a condenser of one microfarad—charged to thirteen million times three thousand volts. Or, in nice, hollow, round numbers, forty billion volts! Four times ten to the tenth. Of course, it won't get that far. It'll arc across the contacts before it gets that high, but it might raise particular hell on the way out. Take it easy, Wes. We're seventy million-

odd miles from the nearest large body of dirt, all collected in a little steel bottle about three miles long and a mile in diameter. I'd hate to stop all interplanetary communications while we scraped ourselves off of the various walls and treated ourselves for electric shock. It would —the discharge itself, I mean— raise hell with the equipment anyway. So play it easy, Wes. We do not permit certain experiments out here because of the slow neutrons that sort of wander through here at fair density. Likewise, we cannot permit dangerous experiments. And anything that includes a dangerous experiment must be out, too."

"Oh," said Wes. His voice and attitude were together crestfallen.

"Don't take it so hard, fella," grinned Channing. "Anytime we have to indulge in dangerous experiments, we always do it with an assistant—and in one of the blister-laboratories. But take that fragile glassware out of the picture and I'll buy it," he finished.

Walt Franks entered and asked what was going on.

"Wes was just demonstrating the latest equipment in concentrated deviltry," smiled Channing.

"That's my department," said Walt.

"Oh, it's not as bad as your stuff," said Channing. "What he's got here is an alloy that will break several million watts without an arc. Great stuff, Walt."

"Sounds swell," said Walt. "Better scribble it up and we'll get a patent. It sounds useful."

"I think it may bring us a bit of change," said Channing. "It's great stuff, Wes."

"Thanks. It annoyed me to see those terrific oil-breakers we have here. All I wanted to do was to replace 'em with something smaller and more efficient."

"You did, Wes. And that isn't all. How did you dream up that high-dielectric?"

"Applied several of the physical phenomena."

"That's a good bet, too. We can use several fluids of various dielectric constants. Can you make solids as well?"

"Not as easily. But I can try—?"

"Go ahead and note anything you find above the present, listed compounds and their values."

"I'll list everything, as I always do."

"Good. And the first thing to do is to can that stuff in a steel case."

"It'll have to be plastalloy."

"That's as strong as steel and nonconducting. Go ahead."

Channing led Franks from the laboratory, and once outside Channing gave way to a session of the shakes. "Walt," he asked plaintively, "take me by the hand and lead me to Joe's. I need some vitamins."

"Bad?"

"Did you see that glassblower's nightmare?"

"You mean that collection of cut glass?" grinned Walt. "Uh-huh. It looked as though it were about to collapse of its own dead weight."

"That held an electrolyte of di-

electric constant thirteen times ten to the sixth. He had it charged to a mere three thousand volts. Ye Gods, Walt. Thirteen farads at three KV. *Whew.* And when he discharged it, the confounded leads that went through the glass sidewalls to the condenser plates positively glowed in the cherry red. I swear it!"

"He's like that," said Walt. "You shouldn't worry about him. He'll have built that condenser out of good stuff—the leads will be alloys like those we use in the bigger tubes. They wouldn't fracture the glass seals no matter what the temperature difference between them and the glass was. Having that alloy around the place—up in the tube-maintenance department they have a half ton of quarter-inch rod—he'd use it naturally."

"Could be, Walt. Maybe I'm a worry wart."

"You're not used to working with his kind."

"I quote: 'Requiring a high voltage source of considerable current capacity, I hit upon the scheme of making a super-high capacity condenser and discharging it through my no-arc alloy. To do this it was necessary that I invent a dielectric material of C equals thirteen times ten to the sixth.' Unquote."

"Wes is a pure scientist," reminded Walt. "If he were investigating the electrical properties of zinc, and required solar power magnitudes to complete his investigation, he'd invent it and then include it as incidental to the investigation on zinc. He's never really understood our recent divergence in purpose over the power tube. That we should make it soak up power from Sol was incidental and useful only as a lever or means to make Terran Electric give us our way. He'd have forgotten it, I'll bet, since it was not the ultimate goal of the investigation."

"He knows his stuff, though."

"Granted. Wes is brilliant. He is a physicist, though, and neither engineer nor inventor. I doubt that he is really interested in the practical aspects of anything that is not directly concerned with his eating and sleeping."

"What are we going to do about him?"

"Absolutely nothing. You aren't like him—"

"I hope not."

"And conversely, why should we try to make him like you?"

"That I'm against!" chimed in a new voice. Arden Channing took each man by the arm and looked up on either side of her, into one face and then the other. "No matter how, why, when, who, or what, one like him is all that the solar system can stand."

"Walt and I are pretty much alike."

"Uh-huh. You are. That's as it should be. You balance one another nicely. You couldn't use another like you. You're speaking of Wes Farrell?"

"Right."

"Leave him alone," said Arden sagely. "He's good as he is. To make him similar to you would be to spoil a good man. He'd then be

neither fish, flesh, nor fowl. He doesn't think as you do, but instead proceeds in a straight line from remote possibility to foregone conclusion. Anything that gets needed en route is used, or gadgeteered and forgotten. That's where you come in, fellows. Inspect his by-products. They may be darned useful."

"O. K. Anybody care for a drink?"

"Yup. All of us," said Arden.

"Don, how did you rate such a good-looking wife?"

"I hired her," grinned Channing. "She used to make all my stenographic mistakes, remember?"

"And gave up numerous small errors for one large one? Uh-huh. I recall. Some luck."

"It was my charm."

"Baloney. Arden, tell the truth. Didn't he threaten you with something terrible if you didn't marry him?"

"You tell him," grinned Channing. "I've got work to do."

Channing left the establishment known as Joe's and advertised as the "Best bar in twenty-seven million miles, minimum," and made his way toward his office slowly. He didn't reach it. Not right away. He was intercepted by Charley Thomas who invited him to view a small experiment. Channing smiled and said that he'd prefer to see an experiment of any kind to going to his office, and followed Charley.

"You recall the gadget we use to get perfect tuning with the alloy-selectivity transmitter?"

"You mean that variable alloy disk all bottled up and rotated with a selsyn?" asked Don, wondering what came next. "Naturally I remember it. Why?"

"Well, we've found that certain submicroscopic effects occur with inert objects. What I mean is this: Given a chunk of cold steel of goodly mass and tune your alloy-disk to pure steel, and you can get a few micro-microamperes output if the tube is pointed at the object."

"Sounds interesting. How much amplification do you need to get this reading and how do you make it tick?"

"We run the amplifier up to the limit and then sweep the tube across the object sought, and the output meter leaps skyward by just enough to make us certain of our results. Watch!"

Charley set the tube in operation and checked it briefly. Then he took Don's hand and put it on the handle that swung the tube on its gimbals. "Sort of paint the wall with it," he said. "You'll see the deflection as you pass the slab of tool steel that's standing there."

Channing did, and watched the minute flicker of the ultra-sensitive meter. "Wonderful," he grinned, as the door opened and Franks entered.

"Hi, Don. Is it true that you bombarded her with flowers?"

"Nope. She's just building up some other woman's chances. Have you seen this effect?"

"Yeah—it's wonderful, isn't it?"

"That's what I like about this place," said Charley with a huge smile. "That's approximately seven

micro-microamperes output after amplification on the order of two hundred million times. We're either working on something so small we can't see it or something so big we can't count it. It's either fifteen decimal places to the left or to the right. Every night when I go home, I say a little prayer. I say: 'Dear God, please let me find something today that is based upon unity, or at least no more than two decimal places' but it is no good. If He hears me at all, He's too busy to bother with things that the human race classifies as 'One.'"

"How do you classify resistance, current, and voltage?" asked Channing, manipulating the tube on its gimbals and watching the effect.

"One million volts across ten megohms equals one hundred thousand microamperes. That's according to Ohm's Law."

"He's got the zero-madness too," chuckled Walt. "It obtains from thinking in astronomical distances, with interplanetary coverages in watts, and celestial input, and stuff like that. Don, this thing may be handy, some day. I'd like to develop it."

"I suggest that couple of stages of tube-amplification might help. Amplify it before transduction into electronic propagation."

"We can get four or five stages of sub-electronic amplification, I think.

It'll take some working."

"O. K., Charley. Cook ahead. We do not know whither we are heading, but it looks darned interesting."

"Yeah," added Walt, "it's a darned rare scientific fact that can't be used for something, somewhere. Well, Don, now what?"

"I guess we now progress to the office and run through a few reams of paper-work. Then we may relax."

"O. K. Sounds good to me. Let's go."

Hellion Murdoch pointed to the luminous speck in the celestial globe. His finger stabbed at the marker button, and a series of faint concentric spheres marked the distance from the center of the globe to the object, which Murdoch read and mentioned: "Twelve thousand miles."

"Asteroid?" asked Kingman.

"What else?" asked Murdoch. "We're lying next to the Asteroid Belt."

"What are you going to do?"

"Burn it," said Murdoch. His fingers danced upon the keyboard, and high above him, in the dome of the *Black Widow*, a power intake tube swiveled and pointed at Sol. Coupled to the output of the power intake tube, a power output tube turned to point at the asteroid. And Murdoch's poised finger came down on the last switch, closing the final circuit.

Meters leaped up across their scales as the intangible beam of solar energy came silently in and went as silently out. It passed across the intervening miles with the velocity of light squared, and hit the asteroid. A second later the asteroid glowed and melted under the terrific bombardment of solar energy directed in a tight beam.

"It's O. K.," said Hellion. "But have the gang build us three larger tubes to be mounted turretwise. Then we can cope with society."

"What do you hope to gain by that? Surely piracy and grand larceny are not profitable in the light of what we have and know."

"I intend to institute a reign of terror."

"You mean to go through with your plan?"

"I am a man of my word. I shall levy a tax against each and every ship leaving any spaceport. We shall demand one dollar solarian for every gross ton that lifts from any planet and reaches the planetary limit."

"How do you establish that limit?" asked Kingman interestedly.

"Ironically, we'll use the Channing Layer," said Murdoch with dark humor. "Since the Channing Layer describes the boundary below which our solar beam will not work. Our reign of terror will be identified with Channing because of that; it will take some of the praise out of people's minds when they think of Channing and Interplanetary Communications."

"That's pretty deep psychology," said Kingman.

"You should recognize it," smiled Murdoch. "That's the kind of stuff

you legal lights pull. Mention the accused in the same sentence with one of the honored people; mention the defendant in the same breath with one of the hated people—it's the same stunt. Build them up or tear them down by reference."

"You're pretty shrewd."

"I am," agreed Murdoch placidly.

"Mind telling me how you found yourself in the fix you're in?"

"Not at all. I've been interested for years in neuro-surgery. My researches passed beyond the realm of rabbits and monkeys, and I found it necessary to investigate the more delicate, more organized, the higher-strung. That means human beings—though some of them are less sensitive than a rabbit and less delicate than a monkey." Murdoch's eyes took on a cynical expression at this. Then it passed and he continued: "I became famous, as you know. Or do you?"

Kingman shook his head.

"I suppose not. I became famous in my own circle. Lesser neuro-surgeons sent their complex cases to me; unless you were complex, you would never hear of Allison Murdoch. Well anyway, some of them offered exciting opportunities. I—frankly, experimented. Some of them died. It was quite a bit of cut and try because not too much has been written on the finer points of the nervous system. But there were too few people who were complex enough to require my services, and I turned to clinical work, and experimented freely."

"And there you made your mistake?"

"Do you know how?"

"No. I imagine that with many patients you exceeded your rights once too often."

"Wrong. It is a funny factor in human relationship. Something that makes no sense. When people were paying me three thousand dollars an hour for operations, I could experiment without fear. Some died, some regained their health under my ministrations. But when I experimented on charity patients, I could not experiment because of the 'Protection' given the poor. The masses were not to be guinea pigs. Ha!" laughed Murdoch, "only the rich are permitted to be subjects of an experiment. Touch not the poor, who offer nothing. Experiment upon those of intellect, wealth, fame, or anything that sets them above the mob. Yes, even genius came under my knife. But I couldn't give a poor man a fifty-fifty chance at his life, when the chances of his life were less than one in ten. From a brilliant man, operating under fifty-fifty chances for life, I became an inhuman monster that cut without fear. I was imprisoned, and later escaped with some friends."

"And that's when you stole the *Hippocrates* and decided that the solar system should pay you revenge-money?"

"I would have done better if I had not made that one mistake. I forgot that in the years of imprisonment, I fell behind in scientific knowledge. I know now that no

one can establish anything at all without technical minds behind him."

Kingman's lips curled. "I wouldn't agree to that."

"You should. Your last defeat at the hands of the technicians you scorn should have taught you a lesson. If you had been sharp, you would have outguessed them; outengineered them. They, Kingman, were not afraid to rip into their detector to see what made it tick."

"But I had only the one—"

"They knew one simple thing about the universe. That rule is that if anything works once, it may be made to work again." He held up his hand as Kingman started to speak. "You'll bring all sorts of cases to hand and try to disprove me. You can't. Oh, you couldn't cause a quick return of the diplodocus, or re-enact the founding of the solar government, or even reburn a ton of coal. But there is other carbon, there will be other governmental introductions and reforms, and there may some day be the rebirth of the dinosaur—on some planet there may be carboniferous ages now. Any phenomena that is a true phenomena—and your detector was definite, not a misinterpretation of effect—can be repeated. But, Kingman, we'll not be outengineered again."

"That I do believe."

"And so we will have our revenge on Interplanetary Communications and upon the system itself."

"We're heading home now?"

"Right. We want this ship fitted with the triple turret I mentioned before. Also I want the interconnecting links between the solar intake and the power-projectors beefed up. When you're passing several hundred megawatts through any system, losses of the nature of .000,000,1% cause heating to a dangerous degree. We've got to cut the I^2R losses. I gave orders that the turret be started, by the way. It'll be almost ready when we return."

"*You* gave orders?" said Kingman.

"Oh yes," said Hellion Murdoch with a laugh. "Remember our last bout with the stock market? I seem to have accumulated about forty-seven percent. That's sufficient to give me control of our company."

"But . . . but—" spluttered Kingman. "That took money—"

"I still have enough left," said Murdoch quietly. "After all, I spent years in the Melanortis Country of Venus. I was working on the *Hippocrates* when I wasn't doing a bit of mining. There's a large vein of platiniridium there. You may answer the rest."

"I still do not get this piracy."

Murdoch's eyes blazed. "That's my interest. That's my revenge! I intend to ruin Don Channing and Venus Equilateral. With the super turret they'll never be able to catch us, and we'll run the entire system."

Kingman considered. As a lawyer, he was finished. His last try at the ruination of the Venus Equilateral crowd by means of pirating the interplanetary communications

beam, well that was strictly a violation of the Communications Code. The latter absolutely prevented any man or group of men from diverting communications not intended for them and using these communications for their own purpose. His defense that Venus Equilateral had also violated the law went unheard. It was pointed out to him that Venus Equilateral tapped his own line, and the tapping of an illegal line was the act of a communications agent in the interest of the government. He was no longer a lawyer, and in fact he had escaped a long jail term by sheer bribery.

He was barred from legal practice, and he was barred from any business transactions. The stock market could be manipulated, but only through a blind, which was neither profitable nor safe.

His holdings in Terran Electric was all that stood between him and ruin. He was no better off than Murdoch, save that he was not wanted.

But—

"I'm going to remain on Terra and run Terran Electric like a model company," he said. "That'll be our base."

"Right. Except for a bit of research along specified lines, you will do nothing. Your job will be to act apologetic for your misdeeds. You will grovel on the floor before any authority, and beseech the legal profession to accept you once more. I will need your help, there. You are to establish yourself in the good graces of the Interplanetary Patent Office and report to me any applications that may be of interest. The research that Terran Electric will conduct will be along innocuous lines. The real research will be conducted in a secret laboratory. The one in the Melanortis Country. Selected men will work there, and the Terran Electric fleet of cargo-carriers will carry the material needed. My main failure was not to have provided a means of knowing what the worlds were doing. I'll have that now, and I shall not be defeated again."

"We'll say that one together!" said Kingman. He flipped open a large book and set the autopilot from a set of figures. The *Black Widow* turned gently and started to run for Terra at 2-G.

Walt Franks frowned at the memorandum in his hand. "Look, Don, are we ever going to get to work on that deal with Keg Johnson?"

"Uh-huh," answered Don, without looking up.

"He's serious. Transplanet is getting the edge, and he doesn't like it."

"Frankly, I don't like dabbling in stuff like that either. But Keg's an old friend, and I suppose that's how a guy gets all glommed up on projects, big business deals, and so forth. We'll be going in directly. Why the rush?"

"A bit of personal business on Mars which can best be done at the same time, thus saving an additional trip."

"O. K.," said Don idly. "Might

as well get it over with. Can you pack in an hour?"

"Sure. I'll be there."

Actually, it was less than an hour before the *Relay Girl* went out of the South End Landing Stage, turned, and headed for Mars. Packing to the Channings was a matter of persuading Arden not to take everything but the drapes in the apartment along with her, while for Walt Franks it was a matter of grabbing a trunkful of instruments and spare parts. Space travel is a matter of waiting for days in the confines of a small bubble of steel. Just waiting. For the scenery is unchanging all the way from Sol to Pluto—and is the same scenery that can be seen from the viewports of Venus Equilateral. Walt enjoyed his waiting time by tinkering; having nothing to do would have bored him, and so he took with him enough to keep him busy during the trip.

At two Terran gravities, the velocity of the *Relay Girl* built up bit by bit and mile by mile until they were going just shy of one thousand miles per second. This occurred an hour before turnover, which would take place at the twenty-third hour of flight.

And at that time there occurred a rarity. Not an impossibility like the chances of collision with a meteor, those things happen only once in a lifetime, and Channing had had his collision. Nor was it as remote as getting a royal flush on the deal. It happened, not often, but it did happen to some ships occasionally.

Another ship passed within detector range.

The celestial globe glimmered faintly and showed a minute point at extreme range. Automatic marker spheres appeared concentrically within the celestial globe and colures and diameters marked the globe off into octants. A dim red line appeared before the object, giving the probable course of the object.

Bells rang briefly, and the automatic meteor circuits interpreted the orbit of the oncoming object and decided that the object was not dangerous. Then they relaxed. Their work was done until another object came within range for them to inspect. They were no longer interested, and they forgot about the object with the same powers of complete oblivion that they would have exerted on a meteor of nickle and iron.

They were mechanically incapable of original thought. So the object, to them, was harmless.

Channing looked up at the luminescent spot, sought the calibration spheres, made a casual obesrvation, and forgot about it. To him it was a harmless meteor.

Even the fact that his own velocity was a thousand miles per second, and the object's velocity was the same, coming to them on a one hundred and seventy degree course and due to pass within five thousand miles did not register. Their total velocity of two thousand miles did not register just because of that rarity with which ships pass within detector range, while

meteors are encountered often.

Had Channing been thinking about the subject in earnest, he would have known—for it is only man, with all too little time, who uses such velocities. The universe, with eternity in which to work her miracle, seldom moves in velocities greater than forty or fifty miles per second.

Channing forgot it, and as the marker-spheres switched to accommodate the approaching object, he turned to more important things.

In the other ship, Hellion Murdoch frowned. He brightened, then, and depressed the plunger that energized his solar beam and projector. He did not recognize the oncoming object for anything but a meteor, either, and his desire was to find out how his invention worked at top speeds.

Kingman asked: "Another one?"

"Uh-huh," said Murdoch idly. "I want to check my finders."

"But they can't miss."

"No? Look, lawyer, you're not running a job that may be given a stay or a reprieve. The finders run on light velocities. The solar beam runs on the speed of light squared. We'll pass that thing at five thousand miles and at two thousand accumulative miles per second. A microsecond of misalignment, and we're missing, see? I think we're going to be forced to put correction circuits in so that the vector sums and velocities and distances will all come out with a true hit. It will not be like sighting down a searchlight beam at high velocity."

"I see. You'll need compensation?"

"Plenty, at this velocity and distance. This is the first time I've had a chance to try it out."

The latter fact saved the *Relay Girl.* By a mere matter of feet, and inches; by the difference between the speed of light and the speed of light squared at a distance of five thousand miles, plus a slight miscompensation. The intolerably hot umbra of Murdoch's beam followed below the pilot's greenhouse of the *Relay Girl* all the way past, a matter of several seconds. The spill-over was tangible enough to warm the *Relay Girl* to uncomfortable temperatures.

Then with no real damage done, the contact with ships in space was over, but not without a certain minimum of recognition.

"Hell!" said Kingman. "That was a space craft."

"Who?"

"I don't know. You missed."

"I'd rather have hit," said Murdoch coldly. "I hope I missed by plenty."

"Why?"

"If we scorched their tails any, there'll be embarrassing questions asked."

"So—?"

"So nothing until we're asked. Even then you know nothing."

In the *Relay Girl,* Channing mopped his forehead. "That was hell itself," he said.

Arden laughed uncertainly. "I thought that it would wait until we

got there; I didn't expect hell to come after us."

"What — exactly — happened?" asked Walt, coming into the scanning room.

"That—was a spaceship."

"One of this system's?"

"I wonder," said Don honestly. "It makes a guy wonder. It was gone too fast to make certain. It probably was Solarian, but they tried to burn us with something."

"That makes it sound like something alien," admitted Walt. "But that doesn't make good sense."

"It makes good reading," laughed Channing. "Walt, you're the Boy Edison. Have you been tinkering with anything of lethal leanings?"

"You think there may be something powerful afloat?"

"Could be. We don't know everything."

"I've toyed with the idea of coupling a solar intake beam with one of those tubes that Baler and Carroll found. Recall, they smashed up quite a bit of Lincoln Head before they uncovered the secret of how to handle it. Now that we have unlimited power—or are limited only by the losses in our own system—we could, or should be able to, make something rawther tough."

"You've toyed with the idea, hey?"

"Uh-huh."

"Of course you haven't really tried it?"

"Of course not."

"How did it work?"

"Fair," grinned Walt. "I did it with miniatures only, of course, since I couldn't get my hooks on a full-grown tube."

"Say," asked Arden, "how did you birds arrive at this idea so suddenly? I got lost at the first premise."

"We passed a strange ship. We heated up to uncomfortable temperatures in a matter of nine seconds flat. They didn't warm us with thought waves, or vector-invectives. Sheer dislike wouldn't do it alone. I guess that someone is trying to do the trick started by our esteemed Mr. Franks here a year or so ago. Only with something practical instead of an electron beam. Honest-to-goodness energy, right from Sol himself, funneled through some tricky inventions. Walt, that experiment of yours. Did you bring it along?"

Walt looked downcast. "No," he said. "It was another one."

"Let's see."

"It's not too good—"

"Same idea?"

Walt went to get his experiment. He returned with a tray full of laboratory glassware, all wired into a maze of electronic equipment.

Channing went white. "You, too?" he yelled.

"Take it easy, sport. This charges only to a hundred volts. We get thirteen hundred microfarads at one hundred volts. Then we drain off the dielectric fluid, and get one billion three hundred million volts charge in a condenser of only one hundred micro-microfarads. It's an idea for the nuclear physics boys. I think it may tend to solidify some of the uncontrollables

in the present system of developing high electron velocities."

"That thirteen million dielectric constant stuff is strictly electro-dynamite, I think," said Channing. "Farrell may have developed it as a by-product, but I have a hunch that it will replace some heretofore valuable equipment. The Franks-Farrell generator will outdo Van-Der Graf's little job, I think."

"Franks-Farrell?"

"Sure. He thunk up the dielectric. You thunk up the application. He won't care, and you couldn't have done it without. Follow?"

"Oh sure. I was just trying to figure out a more generic term for it."

"Don't. Let it go as is for now. It's slick, Walt, but there's no weapon in it."

"You're looking for a weapon?"

"Uh-huh. Ever since Murdoch took a swing at Venus Equilateral, I've been sort of wishing that we could concoct something big enough and dangerous enough to keep us free from any other wiseacres. Remember, we stand out there like a sore thumb. We are as vulnerable as a half pound of butter at a banquet for starving Armenians. The next screwball that wants to control the system will have to control Venus Equilateral first. And the best things we can concoct to date include projectile-tossing guns at velocities of less than the speed of our ships, and an electron-shooter that can be overcome by coating the ship with any of the metal-salts that enhance secondary emission."

"Remind me to requisition a set of full-sized tubes when we return. Might as well have some fun."

"O. K., you can have 'em. Which brings us back to the present. Question: Was that an abortive attempt upon our ship, or was that a mistaken try at melting a meteor?"

"I know how to find out. Let's call Charley Thomas and have him get on the rails. We can have him request Terran Electric to give us any information they may have on energy beams to date."

"They'd tell you?" scorned Arden.

"If they write *no!*, and we find out that they did, we'll sue 'em dead. They're too shaky to try anything deep right now."

"Going to make it an official request, hey?"

"Right. From the Station, it'll go out in print, and their answer will be on the 'type, too, since business etiquette requires it. They'll get the implication if they're on the losing end. That'll make 'em try something slick. If they're honest, they'll tell all."

"That'll do it all right," said Walt. "They're too shaky to buck us any more. And if they are trying anything, it'll show."

The rest of the trip was without incident. They put in at Canalopsis and found Keg Johnson with an official 'gram waiting for them. Don Channing ripped it open and read:

Interplanetary Communications
Attention Dr. Channing:

No project for energy beam capable of removing meteors under way at Terran

Electric, or at any of the subsidiary companies. Ideas suggested along these lines have been disproven by your abortive attempt of a year ago, and will not be considered unless theory is substantiated in every way by practical evidence.

If you are interested, we will delve into the subject from all angles. Please advise.

Terran Electric Co.
Board of Legal Operations
Mark Kingman, LLD.

Channing smiled wryly at Keg Johnson and told him of their trouble.

"Oh?" said Keg, with a frown. "Then you haven't heard?"

"Heard what?"

"Hellion Murdoch has been on the lose for weeks."

"Weeks!" yelled Channing.

"Uh-huh. He feigned gangrene, was taken to the base hospital where he raised hob in his own, inimitable way. He blasted the communications set-up completely, ruined three spaceships, and made off with the fourth. The contact ship just touched there recently and found hell brewing. If they hadn't had a load of supplies and prisoners for the place, they wouldn't have known about it for months, perhaps."

"So! Brother Murdoch is loose again. Well! The story dovetails in nicely."

"You think that was Hellion himself?"

"I'd bet money on it. The official report on Hellion Murdoch said that he was suffering from a very silght peresecution complex, and that he was capable of making something of it if he got the chance. He's slightly whacky, and dangerously so."

"He's a brilliant man, isn't he?"

"Quite. His name is well known in the circles of neuro-surgery. He is also known to be an excellent research worker in applied physics."

"Nuts, hey?" asked Walt.

"Yeah, he's nuts. But only in one way, Walt. He's nuts to think that he is smarter than the entire solar system all put together. Well, what do we do now?"

"Butter ourselves well and start scratching for the answer. That betatron trick will not work twice. There must be something."

"O. K., Walt. We'll all help you think. I'm wondering how much research he had to do to develop that beam. After all, we were five thousand miles away, and he heated us up. He must've thought we were a meteor—and another thing, too—he must've thought that his beam was capable of doing something at five thousand miles distance or he wouldn't have tried. Ergo he must have beaten that two hundred mile bugaboo."

"We don't know that the two hundred mile bugaboo is still bugging in space," said Walt, slowly. "That's set up so that the ionization-by-products are not dangerous. Also, he's not transmitting power from station to station, et cetera. He's ramming power into some sort of beam and to the devil with losses external to his equipment. The trouble is, darn it, that we'll have to spend a month just building a large copy of my miniature set-up."

"A month is not too much time,"

agreed Channing. "And Murdoch will take a swing at us as soon as he gets ready to reach. We can have Charley start building the big tubes immediately, can't we?"

"Just one will be needed. We'll use one of the standard solar intake tubes that we're running the Station from. There's spare equipment aplenty. But the transmitter-terminal tube will take some building."

"Can we buy one from Terran Electric?"

"Why not? Get the highest rating we can. That should be plenty. Terran probably has them in stock, and it'll save us building one."

"What is their highest rating?"

"Two hundred megawatts."

"O. K. I'll send 'em a coded requisition with my answer to their letter."

"What are you going to tell 'em?"

"Tell 'em not to investigate the energy-gun idea unless they want to for their own reasons," Channing grinned. "They'll probably assume—and correctly—that we're going to tinker ourselves."

"And?"

"Will do nothing since it is an extra-planetary proposition. Unless it becomes suitable for digging tunnels, or melting the Martian ice cap," laughed Channing.

Mark Kingman took the letter to Murdoch, who was hidden in the depths of the *Black Widow*. Hellion read it twice, and then growled.

"They smell something, sure," he snarled. "Why didn't we make that a perfect hit!"

"What are we going to do now?"

"Step up our plans. They'll have this thing in a few weeks. Hm-m-m. They order a transmitter terminal tube. Have you got any in stock?"

"Naturally. Not in stock, but available for the Northern Landing power-line order."

"You have none, then. You will have some available within a few days. That half-promise will stall them from making their own, and every day that they wait for your shipment is a day in our favor. To keep your own nose clean, I'll tell you when to ship the tube. It'll be a few days before I strike."

"Why bother?" asked Kingman. "They won't be around to call names."

"No, but their friends will, and we want to keep them guessing."

"I see. Those tubes are huge enough to excite comment, and there will be squibs in all the papers telling of the giant going to Venus Equilateral, and the Sunday Supplements will all break out in wild guesses as to the reason why Venus Equilateral wants a two-hundred megawatt tube. Too bad you couldn't keep your escape a longer secret."

"I suppose so. But it was bound to be out sooner or later anyway. A good general, Kingman, is one whose plans may be changed on a moment's notice without sacrificing. We'll win through."

The days wore on, and the big turret on the top of the *Black Widow* took shape. The super-tubes were installed, and Murdoch

worked in the bowels of the ship to increase the effectiveness of the course-integrators to accommodate high velocities and to correct for the minute discrepancies that would crop up due to the difference in velocities between light and sub-electronic radiation.

And on Venus Equilateral, the losing end of a war of nerves was taking place. The correspondence by 'type was growing into a reasonable pile, while the telephone conversations between Terran Electric and Venus Equilateral became a daily proposition. The big tubes were not finished. The big tubes were finished, but rejects because of electrode-misalignments. The big tubes were in the rework department. The big tubes were on Luna for their testing. And again they were rejects because the maximum power requirements were not met. They were returned to Evanston and were once more in the rework department. You have no idea how difficult the manufacture of two hundred megawatt tubes really is.

So the days passed, and no tubes were available. The date passed which marked the mythical date of 'if'—*If* Venus Equilateral had

started their own manufacturing division on the day they were first ordered from Terran Electric, they would have been finished and available.

Then, one day, word was passed along that the big tubes were shipped. They were on their way, tested and approved, and would be at Venus Equilateral within two days. In the due course of time, they arrived, and the gang at the Relay Station went to work on them.

But Walt Franks shook his head. "Don, we'll be caught like a sitting rabbit."

"I know. But—?" answered Channing.

There was no answer to that question, and so they went to work again.

The news of Murdoch's first blow came that same day. It was a news report from the Interplanetary Network that the Titan Penal Colony had been attacked by a huge black ship of space that carried a huge dome-shaped turret on the top. Beams of invisible energy burned furrows in the frozen ground, and the official buildings melted and exploded from the air pressure within them. The Titan station went off the ether with a roar, and the theorists believed that Murdoch's gang had been augmented by four hundred and nineteen of the Solar System's most vicious criminals.

"That rips it wide open," said Channing. "Better get the folks to prepare to withstand a siege. I don't think they can take us."

"That devil might turn his beams on the Station itself, though," said Walt.

"He wants to control communications."

"With the sub-electron beams we now have, he could do it on far less Station for some time. Not perfectly, but he'd get along."

"Fine future," gritted Channing. "This is a good time to let this project coast, Walt. We've got to start in from the beginning and walk down another track."

"It's easy to say, chum."

"I know it. So far, all we've been able to do is to take energy from the solar intake beams and spray it out into space. It goes like the arrow that went—we know not where."

"So?"

"Forget these gadgets. Have Charley hook up the solar intake tubes to the spotter and replace the cathodes with pure thorium. I've got another idea."

"O. K., but it sounds foolish to me."

Channing laughed. "We'll stalemate him," he said bitterly, and explained to Walt. "I wonder when Murdoch will come this way?"

"It's but a matter of time," said Walt. "My bet is as soon as he can get here with that batch of fresh rats he's collected."

Walt's bet would have collected. Two days later, Hellion Murdoch flashed a signal into Venus Equilateral and asked for Channing.

"Hello, Hellion," answered Channing. "Haven't you learned to keep out of our way?"

worked in the bowels of the ship to increase the effectiveness of the course-integrators to accommodate high velocities and to correct for the minute discrepancies that would crop up due to the difference in velocities between light and sub-electronic radiation.

And on Venus Equilateral, the losing end of a war of nerves was taking place. The correspondence by 'type was growing into a reasonable pile, while the telephone conversations between Terran Electric and Venus Equilateral became a daily proposition. The big tubes were not finished. The big tubes were finished, but rejects because of electrode-misalignments. The big tubes were in the rework department. The big tubes were on Luna for their testing. And again they were rejects because the maximum power requirements were not met. They were returned to Evanston and were once more in the rework department. You have no idea how difficult the manufacture of two hundred megawatt tubes really is.

So the days passed, and no tubes were available. The date passed which marked the mythical date of 'if'—*If* Venus Equilateral had

fort along another line."

"That's not all—?"

"No. Frankly, I'm almost certain that your beam won't do a thing to Venus Equilateral."

"We'll see. Listen! Turretman! Are you ready?"

Faintly, the reply came, and Channing could hear it. "Ready!"

"Then fire all three. Pick your targets at will. One blast!"

The lights in Venus Equilateral brightened. The thousands of line-voltage meters went from one hundred and twenty-five to one hundred and forty volts, and the line-frequency struggled with the crystal-control and succeeded in making a ragged increase from sixty to sixty point one five cycles per second. The power-output meters on the transmitting equipment went up briefly, and in the few remaining battery-supply rooms, the overload and overcharge alarms clanged until the automatic adjusters justified the input against the constant load. One of the ten-kilowatt modulator tubes flashed over in the audio-room and was immediately cut from the operating circuit; the recording meters indicated that the tube had gone west forty-seven hours prior to its expiration date due to filament overload. A series of fluorescent lighting fixtures in a corridor of the Station that should have been dark because of the working hours of that section, flickered into life and woke several of the workers, and down in the laboratory, Wes Farrell swore because the fluctuating line had disrupted one of his experiments, giving him reason to doubt the result. He tore the thing down and began once more; seventy days work had been ruined.

"Well," said Channing cockily, "is that the best you can do?"

"You—!"

"You forgot," reminded Channing, "that we have been working with solar power, too. In fact, we discovered the means to get it. Go ahead and shoot at us, Murdoch. You're just giving us more power."

"Cease firing!" exploded Murdoch.

"Oh don't!" cheered Don. "You forgot that those tubes, if aligned properly, will actually cause bending of the energy-beam. We've got load-terminal tubes pointing at you, and your power-beam is bending to enter them. You did well, though. You were running the whole Station with plenty to spare. We had to squirt some excess into space. Your beams aren't worth the glass that's in them!"

"Stalemate, then," snarled Murdoch. "Now *you* come and get *us*. We'll leave. But we'll be back. Meanwhile, we can have our way with the shipping. Pilot! Course for Mars! Start when ready!"

The *Black Widow* turned and streaked from Venus Equilateral as Don Channing mopped his forehead. "Walt," he said, "that's once I was scared to death."

"Me, too. Well, we got a respite. Now what?"

"We start thinking."

"Right. But of what?"

"Ways and— Hello, Wes. What's the matter?"

Farrell entered and said: "They broke up my job. I had to set it up again, and I'm temporarily free. Anything I can do to help?"

"Can you dream up a space-gun?"

Farrell laughed. "That's problematical. Energy guns are something strange. Their output can be trapped and used to good advantage. What you need is some sort of projectile, I think."

"But what kind of projectile would do damage to a spaceship?"

"Obviously the normal kinds are useless. Fragmentation shells would pelt the exterior of the ship with metallic rain—if and providing you could get them that close. Armor-piercing would work, possibly, but their damage would be negligible since hitting a spacecraft with a shell is impossible if the ship is moving at anything like the usual velocities. Detonation shells are a waste of energy, since there is no atmosphere to expand and cantract. They'd blossom like roses and do as much damage as a tossed rose."

"No projectiles, then."

"If you could build a super-heavy fragmentation and detonation shell and combine it with armor-piercing qualities, and could hit the ship, you might be able to stop 'em. You'd have to pierce the ship, and have the thing explode with a terrific blast. It would crack the ship because of the atmosphere trapped in the hull—and should be fast enough to exceed the compressibility of air. Also it should happen so fast that the air leaving the hole made would not have a chance to deerease the pressure. The detonation would crack the ship, and the fragmentation would mess up the insides to boot, giving two possibilities. But if both failed and the ship became airless, they would fear no more detonation shells. Fragments would always be dangerous, however."

"So now we must devise some sort of shell—?"

"More than that. The meteor-circuits would intercept the incoming shell and it would never get there. What you'd need is a series of shells—say a hundred, all emitting the meteor-alarm primary signals, which would cause paralysis of the meteor-circuits. Then the big one, coming in at terrific velocity."

"And speaking of velocity," said Walt Franks. "The projectile and the rifle are out. We can get better velocity with a constant-acceleration drive. I say torpedoes!"

"Naturally. But the aiming? Remember, even though we crank up the drive to 50-G, it takes time to get to several thousand miles per second. The integration of a course would be hard enough, but add to it the desire of men to evade torpedoes—and the aiming job is impossible."

"We may be able to aim them with a device similar to the one Charley Thomas is working with. Murdoch said his hull was made of lithium?"

"Coated with," said Channing

"Well. Set the alloy-selectivity disk to pure lithium, and use the output to stear the torpedo right down to the bitter end."

"Fine. Now the armor-piercing qualities."

"Can we drill?"

"Nope. At those velocities, impact would cause detonation, the combined velocities would look like a detonation wave to the explosive. After all, darned few explosives can stand shock waves that propagate through them at a few thousand miles per second."

"O.K. How do we drill?"

"We might drill electrically," suggested Farrell. "Put a beam in front?"

"Not a chance," grinned Channing. "The next time we meet up with Hellion Murdoch, he'll have absorbers ready for use. We taught him that one, and Murdoch is not slow to learn."

"So how do we drill?"

"Wes, is that non-arcing alloy of yours very conductive?"

"Slightly better than aluminum."

"Then I've got it! We mount two electrodes of the non-arcing alloy in front. Make 'em heavy and of monstrous current-carrying capacity. Then we connect them to a condenser made of Farrell's super-dooper dielectric."

"You bet," said Walt, grinning. "We put a ten microfarad condenser in front, only it'll be one hundred and thirty farads when we soak it in Farrell's super-dielectric. We charge it to ten thousand volts, and let it go."

"We've got a few experimental jobs," said Channing. "Those inerts. The drones we were using for experimental purposes. They were radio controlled, and can be easily converted to the aiming-circuits."

"Explosives?"

"We'll get the chemistry boys to brew a batch."

"Hm-m-m. Remind me to quit Saturday," said Walt. "I wonder how a ten farad condenser would drive one of those miniatures."

"Pretty well, I should imagine. Why?"

"Why not mount one of the miniatures on a gunstock and put a ten farad condenser in the handle? Make a nice side arm."

"Good for one shot, and not permanently charged. You'd have to cut your leakage down plenty."

"Could be. Well, we'll work on that one afterwards. Let's get that drone fixed."

"Let's fix up all the drones we have. And we'll have the boys wire up as many as they can of the little message-cannisters. The whole works go at once at the same acceleration, with the little ones running interference for the big boy."

"Murdoch invited us to 'come and get him,'" said Channing in a hard voice. "That, I think we'll do!"

Four smoldering derelicts lay in absolute wreckage on or near the four great spaceports of the solar system. Shipping was at an unequaled standstill, and the communications beams were loaded with argument and recriminations and pleas as needed material did not arrive as per agreement. Three ships paid out one dollar each gross ton in order to take vital mer-

chandise to needy parties, but the mine-run of shipping was unable to justify the terrific cost.

And then Don Channing had a long talk with Keg Johnson of Interplanetary Transport.

One day later, one of Interplanetary's larger ships took off from Canalopsis without having paid tribute to Murdoch. It went free—completely automatic—into the Martian sky and right into Murdoch's hands. The pirate gunned it into a molten mass and hurled his demands at the system once more, and left for Venus since another ship would be taking off from there.

In the *Relay Girl,* Don Channing smiled. "That finds Murdoch," he told Walt. "He's on the standard course for Venus from Mars."

"Bright thinking," commented Walt. "Bait him on Mars and then offer him a bite at Venus. When'll we catch him?"

"He's running, or will be, at about 3-G, I guess. We're roaring along at five and will pass Mars at better than four thousand miles per second. I think we'll catch and pass the *Black Widow* at the quarter-point, and Murdoch will be going at about nine hundred miles per. We'll zoom past, and set the finder on him, and then continue until we're safely away. If he gets tough, we'll absorb his output, though he's stepped it up to the point where a spacecraft can't take too much concentrated input."

"That's how he's been able to blast those who went out with absorbers?"

"Right. The stuff on the Station was adequate to protect, but an ordinary ship couldn't handle it unless the ship were designed to absorb and dissipate that energy. The beam-tubes would occupy the entire ship, leaving no place for cargo. Result: A toss-up between paying off and not carrying enough to make up the difference."

"This is Freddy," spoke the communicator. "The celestial globe has just come up with a target at eight hundred thousand miles."

"O. K., Freddy. That must be the *Black Widow.* How'll we pass her?"

"About thirty thousand miles."

"Then get the finders set on that lithium-coated hull as we pass."

"Hold it," said Walt. "Our velocity with respect to his is about three thousand. We can be certain of the ship by checking the finder-response on the lithium coating. If so, she's the *Black Widow.* Right from here, we can be assured. Jim! Check the finders in the torpedoes on that target!"

"Did," said Jim. "They're on and it is."

"Launch 'em all!" yelled Franks.

"Are you nuts?" asked Channing.

"Why give him a chance to guess what's happening? Launch 'em!"

"Freddy, drop two of the torpedoes and half of the interferers. Send 'em out at 10-G. We'll not put all our eggs in one basket," Channing said to Walt. "There might be a slip-up."

"It'll sort of spoil the effect,"

said Don. "But we're not here for effect."

"What effect?"

"That explosive will be as useless as a slab of soap," said Don. "Explosive depends for its action upon velocity—brother, there ain't no explosive built that will propagate at the velocity of our torpedo against Murdoch."

"I know," said Franks, smiling.

"Shall I yell 'Bombs away' in a dramatic voice?" asked Freddy Thomas.

"Are they?"

"Yup."

"Then yell," grinned Walt. "Look, Don, this should be pretty. Let's hike to the star-camera above and watch. We can use the double-telescope finder and take pix, too."

"It's won't be long," said Channing grimly. "And we'll be safe since the interferers will keep Murdoch's gadget so busy he won't have time to worry us. Let's go."

The sky above became filled with a myriad of flashing spots as the rapidly-working meteor spotters coupled to the big turret and began to punch at the interferers.

The clangor of the alarm made Murdoch curse. He looked at the celestial globe and his heart knew real fear for the first time. This was no meteor shower, he knew from the random pattern. Something was after him, and Murdoch knew who and what it was. He cursed Channing and Venus Equilateral in a loud voice.

It did no good, that cursing. Above his head, the triply mounted turret danced back and forth, freeing a triple-needle of Sol's energy. At each pause another interferer went out in a blaze of fire and a shock-excitation of radio energy that blocked, temporarily, the finder circuits. And as the turret detroyed the little dancing motes, more came speeding into range to replace them, ten to one.

And then it happened. The finder-circuit fell into mechanical indecision as two interferers came at angles, each with the same intensity. The integrators ground together, and the forces they loosed struggled for control.

Beset by opposing impulses, the amplidyne in the turret stuttered, smoked, and then went out in a pungent stream of yellowish smoke that poured from its dust-cover in a high-velocity stream. The dancing of the turret stopped, and the flashing motes in the sky stopped with the turret's death.

One hundred and thirty farads, charged to ten thousand volts, touched the lithium-coated, aluminum side of Murdoch's *Black Widow*. Thirteen billion joules of electrical energy; thirty-six hundred kilowatt hours went against two inches of aluminum. At the three thousand miles per second relative velocity of the torpedo, contact was immediate and perfect. The aluminum hull vaporized under the million upon million of kilovolt-amperes of the discharge. The vaporized hull tried to explode, but was hit by the unthinkable velocity of the torpedo's warhead.

The torpedo itself crushed in

front. It mushroomed under the millions of degrees Kelvin developed by the energy-release caused by the cessation of velocity. For the atmosphere within the *Black Widow* was as immobile and as hard as tungsten steel at its best.

The very molecules themselves could not move fast enough. They crushed together and in compressing brought incandescence.

The energy of the incoming torpedo raced through the *Black Widow* in a velocity wave that blasted the ship itself into incandescence. In a steep wave-front, the vaporized ship exploded in space like a supernova.

It blinded the eyes of those who watched. It overexposed the camera film and the expected pictures came out with one single frame a pure, seared black. The piffling, comparatively ladylike detonation of the System's best and most terrible explosive was completely covered in the blast.

Seconds later, the *Relay Girl* hurtled through the sky three thousand miles to one side of the blast. The driven gases caught the *Girl* and stove in the upper observation dome like an eggshell. The *Relay Girl* strained at her girders, and sprung leaks all through the rigid ship, and after rescuing Don Channing and Walt Franks from the wreckage of the observation dome, the men spent their time welding cracks until the *Relay Girl* landed.

It was Walt who put his finger on the trouble. "That was period for Murdoch," he said. "But Don, the stooge still runs loose. We're going to be forced to take over Mark Kingman before we're a foot taller. He includes Terran Electric, you know. That's where Murdoch got his machine work done."

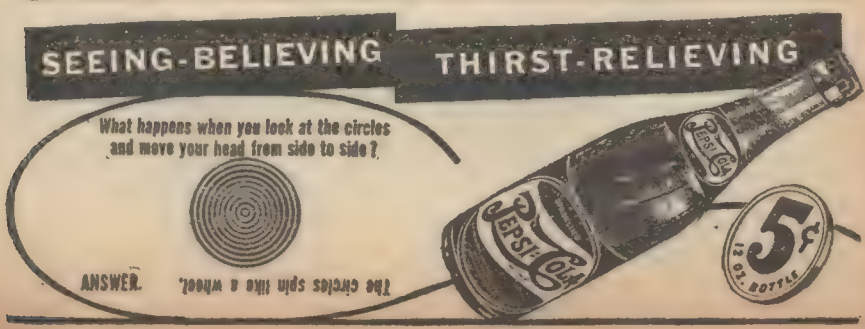
"Without Murdoch, Kingman is fairly harmless," said Don, objecting. "We'll have no more trouble from him."

"You're a sucker, Don. Kingman will still be after your scalp. You mark my words."

"Well, what are you going to do about it?"

"Nothing for the present. I've got some unfinished business to attend to at Lincoln Head. Mind?"

THE END.



IN TIMES TO COME

Next month will, of course, bring part two of "Nomad." This yarn, by the way, is an unusual set-up, more like the usual course of life than the average story in one respect. Generally speaking, a dimwit who starts out to be a hero winds up either dead, or by getting somebody else to be a hero—the man that rescues the would-be hero under impossible circumstances. The infantryman who comes back to our lines with fifty or so prisoners, six machine-gun nests wiped out, and details on the location of four enemy artillery batteries is usually some guy that was sent on a mission, and got captured. From that point on, a remorseless sequence of reactions and events forced him to—for his life—argue his captors into surrendering, get rid of the opposition between him and home-line safety, and take darned careful note of the location of powerful opposition so he could avoid it.

So we start with Guy Maynard—hero. He's been kidnaped, knocked down, kicked out, and forced back to Earth. He had to; now he has to—

Van Vogt's back next month, with the cover story "The Mixed Men." A sequel to the series that started with "Concealment" and "The Storm." As a matter of fact, the line-up proposed for next issue and the next will include nearly all the regular favorites, plus a pair of new names—Robert Abernathy and A. Bertram Chandler.

THE EDITOR.

THE ANALYTICAL LABORATORY

The September reports have interested me in several ways. First, I want to thank the larger number of readers who sent in their votes this time; I can't answer all letters, naturally, though I try to get at as many as possible. The Lab is, naturally, impossible without your support—and it works two ways. The relative ratings of stories in a given issue is readily calculated on a fairly scientific, statistical basis, and appears on these pages. It's a darned sight harder, though, to get the comparative ratings on the best story in the September issue with respect to the stories that appeared in the June issue, for instance. One way that does give me a slight guide, at least, is the total number of letters received. There were a lot more letters on the September issue, than on the August issue, for instance. From which I conclude that the September issue was better liked as a whole, and that, therefore, "A Can of Paint" in September was actually better liked than "Juggernaut."

September is also interesting in that, with a very large number of votes on hand, with a wide scattering of choice, three stories made a dead-heat tie for 3 place.

SEPTEMBER ISSUE:

Place	Story	Author	Points
1.	Renaissance	Raymond F. Jones	1.55
2.	Census	Clifford D. Simak	2.35
3.	Tied:		
	Culture	Jerry Shelton	3.35
	A Can of Paint	A. E. van Vogt	3.35
	Hobo God	Malcolm Jameson	3.35
4.	Business of Killing	Fritz Leiber, Jr.	4.51

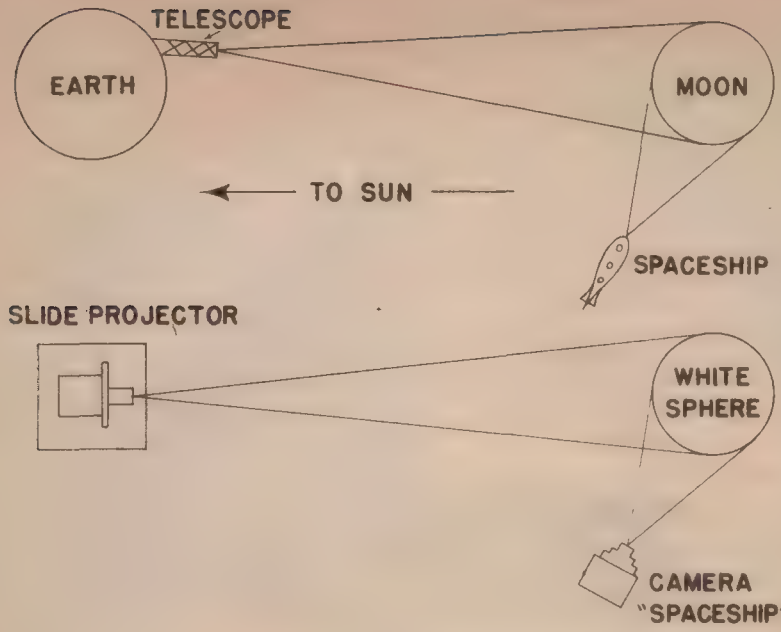
AUGUST ISSUE:

Place	Story	Author	Points
1.	Renaissance	Raymond F. Jones	1.70
2.	The Big and the Little	Isaac Asimov	2.30
3.	Juggernaut	A. E. van Vogt	2.85
4.	Bridgehead	Frank B. Long	3.00

Finally, Probability Zero went as screwy as any of its own yarns. You see, Jerry Shelton's Brass Tacks letter about how to cut vacuums to fit, proceeded to take first prize in Probability Zero—in which it wasn't entered. I feel that anybody who can win the race for First Class Liar without even trying obviously deserves the prize. That brings "Icicle Built for Groo," by John H. Pomeroy ten dollars, and "A Matter of Relativity," by P. Anderson five dollars.

THE EDITOR.

Spaceship's View



Herewith Astounding presents the results of a photographic experiment in spaceflight. Admittedly, the results were somewhat disappointing, but they were highly interesting and suggest that, with better apparatus available, some extremely useful investigations could be made.

The essence of the experiment is outlined in the drawings above. The Moon is a sphere; when a telescope takes a photograph of its surface, the spherical lunar surface is very accurately projected onto a plane surface—the surface of the photographic plate. It is perfectly possible to reverse that purely optical process, and project that plane-image onto a white sphere, producing a sphere-image duplicate. This sphere-image will be three-dimensional; it will be an accurate—in most essentials—reproduction of the original, in its correct relationship. It can, therefore, he photographed from new angles, making it possible to view lunar features from directions never seen by man.

Old hands at lunar observation will undoubtedly be shocked, confused and disturbed by the prints on pages 99 and 101 in particular. The whole layout of the Moon's face is twisted, distorted almost out

The Moon—seen from a point about 100,000 miles north of Earth, and halfway out to the Moon's orbit.

The region around Plato and the Great Valley, in the northern hemisphere, seen from a point overhead. (1.) Plato. (2.) The Great Valley.

of recognition. Each of these shots represents a viewpoint more than one hundred thousand miles out in space—a viewpoint no man has yet attained. The shots on 102 and 103 are less familiar, since they are great enlargements of certain small aspects of the lunar surface. The picture on 102 was taken from a spaceship passing almost directly above the Great Valley and Plato; that on 103 is taken from a viewpoint almost directly above Clavius and Schiller, far to the south.

These photographs are not satisfactory; they were the best we could arrange in New York City at this time. We were limited by purely optical considerations, largely based on the fact that no really large, pure-white sphere was available. A few years back, with a little co-operation from the World's Fair committee, we might have done a really good job, using the Perisphere as our projection screen on a dark night.

Briefly, the problem is this: The photographic plates were made by focusing a sixty-inch or one-hundred-inch telescope on the two-thousand-mile-diameter moon. The smallest feature recorded was several hundred times sixty inches across. The ratio of diameter of lens to diameter of object was prac-

tically one to infinity; the telescope lens constitutes a point.

But in projecting the photographic plate so obtained onto a white sphere of a few feet diameter, we are working with something a long, long way from effective-point-size. Even with the projector lens stopped down to its smallest opening, the lens diameter is greater than the diameter of some of the objects to be shown—then lens diameter is great enough to "look around" the edge of our ersatz moon. If the lens has an effective diameter of a quarter of an inch, there will be

(*Continued on page 178*)

The region of Clavius and Schiller, far to the south of the Moon. Schiller looks oval on ordinary shots of the Moon; this viewpoit shows it is oval, probably due to a low-angle impact. (1.) Clavius. (2.) Schiller.

Moon
THEBIT
HYGINUS ("Wollwerk")
MARE IMBRIUM
LINNE
(would be here)
PITOH
PICO
PLATO
GREAT VALLEY

Moon Mysteries

by WILLY LEY

The Moon as a whole is not so mysterious as it once was—and some of its features are being explained now. Even the craters—which you can duplicate beautifully and simply in your own basement!

Astronomia omnia divisa est in partes tres—

One of these three parts, or disciplines, is quite recent; it is long-distance stellar astronomy, dealing with other suns and other galaxies and relying for its raw material mainly on evidence furnished by the spectroscope and the photographic camera. Because of its recent age we may call it the third of the three disciplines.

Fig. 1. Aerial photographers like dawn light, because shadows bring out details; noon light hides them. For lunar details, full moon is noon-light; half-moon view shows more.

The other two deal with things closer to home and here the distinction is not one of distance and of instruments employed, but one of subject matter. One discipline deals with movements, the other with constitution, topography, et cetera. The one is enormously exact, predicting eclipses, occultations and positions down to minutes and seconds—what meteorologist would even dare to predict even the date of the next thunderstorm?—while the other is, politely speaking, not so exact. Barring the Moon no other large body of our solar system ever comes as

Fig. 2. The astronomer Flammarion pictured the Lunar landscape as a twisted, volcanic area; the true nature of the craters was not known.

Fig. 3. The model for Flammarion's Lunar landscape, shown in Astronomie Populaire, *were these extinct volcanoes in the Auvergne, in France.*

close to Earth as Venus. We know precisely where Venus will be at any given day and hour, we know her weight and size—but we are not even sure about the position of her axis and in any three astronomical books you can find five different opinions about the surface conditions on Venus. As for the Moon which is still closer . . . but we'll speak about that later.

—*divisa est in partes tres,* but the three parts evidently failed to attain equal degrees of perfection. It is a question of instruments and because of that you are perfectly justified to read a different but equally true sense into that classic quotation. You can say that the story of astronomical science consists of three strictly distinct eras, marked by the inventions of astronomical instruments.

The first and earliest era of astronomy is that which began in Babylonic times and continued until

Courtesy: Transcontinental and Western Air

Fig. 4. If it were not for the plane in the foreground—or if the plane had neither wings nor empennage—you could claim this picture of Meteor Crater, Arizona was simply a minor meteor crater, somewhere on the Moon.

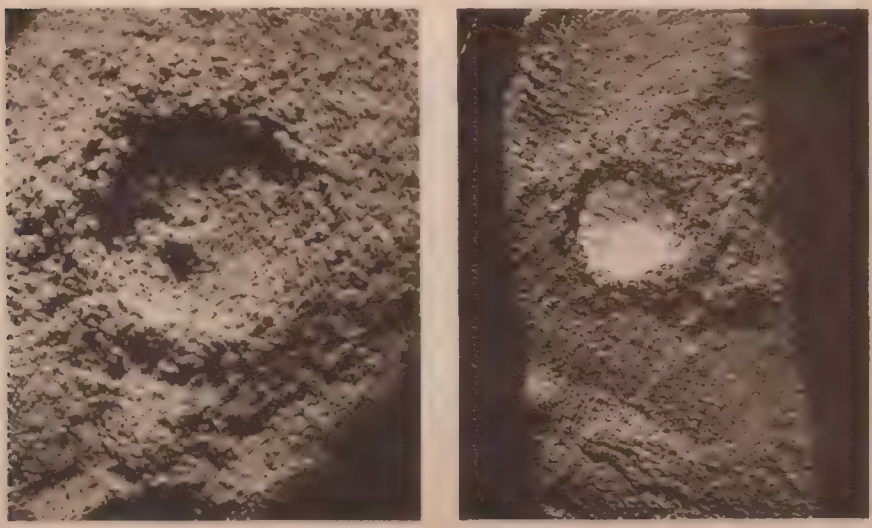
Jan Lippershey in the Netherlands invented the telescope during that stormy portion of human history which is called the Renaissance. That first long era of at least thirty centuries was the era of naked eye observation with no other instruments than some sighting devices for measuring angles and angular distances. During that era astronomy had only one discipline, the one dealing with the motion of the planets. All through that era the astronomer with the better eyes was the better astronomer. That rule had no exception until the very end of the first astronomical era. Curiously enough the one big and important exception was Johannes Kepler, the man who established the true shape of planetary orbits and the three laws of planetary motion named after him.

The invention of the telescope coincided with the climax of Kepler's work. That work was still based on naked eye observations—mostly Tycho Brahe's—and then the telescope opened, literally, new vistas. The second era of astronomy was born and with it the second discipline, that dealing with the topography and the conditions on the planets. Kepler, who for many

years had been writing a book about the Moon, finally saw with his own eyes what even the "best" astronomers before him had not been able to see: the circular ringwalls of our satellite, the so-called "craters." He saw the mountains which were later called the Lunar Alps, the Lunar Apennines and so on, he saw the dark and strangely smooth areas of the *maria*.

The second era of astronomy was the era of the improved eye. First it was straight improvement, the telescope was the bigger and better eye which could see detail where the naked eye, no matter how sharp, had only seen gray smudges. Later on in that era the improvements took another turn. If you stare at a faint spot, it remains faint to your eye, no matter how long you look. The telescope does not change this essential feature. But then the artificial eye did not only get a bigger pupil and a more powerful lens, it also acquired a new retina with the miraculous quality of adding faint impressions

Fig. 5. A perfect representation of the making of a lunar crater, done in miniature, by dropping a tablespoonful of cement powder on a surface of the same material from a height of forty inches. The crater at the left, 120 mm. in diameter, shows a typical central mountain; the other at right, 90 mm. across, resembles Meteor Crater in Arizona. In the second experiment, plaster of Paris powder was dropped to show distribution of "meteoric matter." White splashes could be found as much as a yard from the "crater." The finished crater landscape can be made permanent by simply spraying with water from an atomizer, followed by soaking.



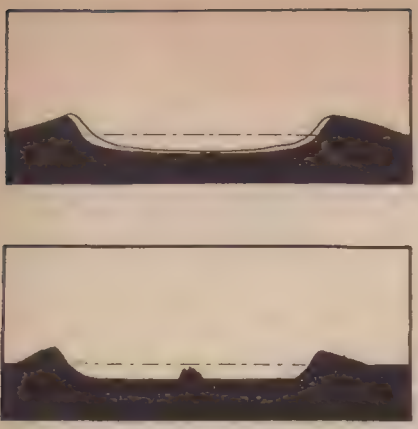


Fig. 6. Top: Cross section of experimental impact crater, the dotted line showing ground level before impact, white line in crater the distribution of the "meteorite." Bottom: Cross section of actual moon crater with central mountain; line as above.

until they became clear: the camera. And then a still more wonderful "eye" was invented, one which did not see the shape and color of things, but one which could see their chemical constitutions—within certain limitations—the spectroscope.

We are still in that second era but our position on the time scale is about that of the newborn Kepler. The second era of astronomy is nearing its end and in about a lifetime the third era is going to begin, with the spaceship added as a new type of astronomical instrument.

It is easy to guess which of the three disciplines will progress most during the third era of astronomy. The stars will be out of reach for a long time to come. The theory of astronomical movements is sufficiently well developed not to need the spaceship very urgently, in fact much of the theory of space travel is based on the reliability of the theory of astronomical movements since the spaceship is essentially, to quote Dr. R. S. Richardson, "an asteroid capable of changing its orbital elements." It is the second discipline, the one concerned with the surfaces of the planets, which *needs* the spaceship. Without it astronomers are helpless even in the case of the Moon, and the Moon is not only the nearest but also by far the best known of all the bodies of the solar system, not counting Earth.

The best proof lies in a few hours at night with a telescope, it does not need to be one of the giant instruments. On and off, for the last twenty years, whenever I had an opportunity of using a telescope, I have sat in the open and usually cold air, looking at the formations of the lunar surface and trying to read some meaning into them. By now they have become quite familiar, but only in about the same sense in which I am familiar with the zoological phenomenon of the Australian duckbill platypus. The better you get to know these things the stranger they appear; it requires a lot of familiarity and knowledge to really appreciate all the quirks and wrinkles and difficulties.

The distance across which you look when searching the face of the Moon for your favorite puzzles is very short as astronomical dis-

Fig. 7. The "Great Valley" of the Lunar Alps, drawn by Ph. Fauth.

Fig. 8. Clavius, in the southern hemisphere, a "walled plain" crater. Clavius, like other "walled plains" is evidently extremely old; both the interior plain, and the ringwall show impact of later meteorites. Some astronomers believe ancient Clavius shows traces of erosion.

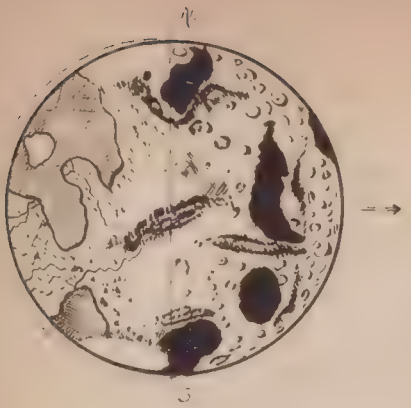


Fig. 9. The astronomer Hansen believed the moon egg-shaped, not spherical, the tip pointing toward Earth. The far side, being "lower," had collected atmosphere. Arrow points toward Earth. Newcomb showed the moon is almost spherical.

tances go. It is only a fraction over one light-second, some 240,000 miles, 384,000 kilometers in the metric system. This is not far even by a purely terrestrial yardstick. I am quite certain that there are many thousands of sailors who have helped to get a liberty ship from the American east coast to British ports, making roundtrip after roundtrip as a matter of routine. When they completed their thirtieth roundtrip they had covered the distance to the Moon.

It is the distance of thirty roundtrips from New York to England, or of forty roundtrips from New York to Hollywood, across which you look when you see the Moon. Looking through a telescope the distance becomes much less, optically speaking. A large astronomical telescope, under fine seeing conditions, can put an astronomer so "near" that the picture he sees is the same as if he were looking—without a telescope—through the window of a spaceship circling the Moon five hundred miles from its surface. The case may be compared to the hypothetical one of a pilot flying high over unknown territory, with enough fuel to cruise endlessly, but unable to land or even to go lower.

Such a position is not without advantages, it is fine for map-making. The pilot could produce a fine general map and one could tell afterwards where mountains, rivers, forests and lakes are located, how the shoreline runs and where the desert begins. The thing the pilot could not produce is a geological survey.

What I said just now about a high-flying plane over unknown territory holds true also for that optical distance of five hundred miles to which a powerful telescope carries the observer or the camera. It is still close enough for excellent map-making; it is somewhat incredible but true that we know the surface of the Moon—that half of it that we can see, that is—better than we know the surface of the Earth. Roughly ten percent of the land surface of our planet is still unknown and is so marked on better maps. Another ten percent is mostly guesswork, based on reports that are still subject to corrections.

There is no guesswork at all on a lunar map.

To make up for such an intolerably ideal state of affairs the interpretation is guesswork all the way through. These beautiful lunar maps are purely topographical, but what we really want, although we usually do not think of it in those terms, are geological—"selenological," if you prefer—surveys. And, since we never had even a single one, these amazingly complete maps are fairly worthless from the point of view of interpretation.

That hypothetical pilot who is cruising high above unknown territory without being able to land at least knows what it is he sees. He knows that a shoreline is a boundary between sea and land, that a river is a continuous depression containing flowing fresh water, that white-capped mountain peaks are white because they are covered with ice and snow. In the case of a forest the pilot's knowledge of longitude and latitude would permit him a fair guess as to the type of forest. Most of his interpreta-

Fig. 10. Section of Moon near Hyginus Chasm, seen near sunset. It creates the impression of some other formation, drowned in hardened lava. The drowned formation is, however, of a type unknown anywhere on Earth.

Fig. 11. The same section as it was "reconstructed" a century ago—when walls and battlements and defense towers were more common on Earth. That the towers would be a mile high to show didn't discourage dreamers.

tion would be correct even though it, strictly speaking, would be based on inference throughout. But the pilot would know other and similar landscapes and would, therefore, be able to draw correct analogies and conclusions. We have, after all, only a few types of climates, moist and warm, moist and cold, dry and warm and dry and cold, superimposed on an equally limited number of topographical features like mountains, highlands, lowlands, et cetera.

The surface of the Moon does not lend itself to such interpretation. Everything we see, virtually without exception, is strange. In only a few instances can we recognize features which we know on Earth too, and they are not very customary on Earth. According to Simon Newcomb's famous word the Moon is a world without weather on which nothing ever happens. This lack of weather should eliminate a number of possible variations of the landscape and it actually does. But that does not help us much, because it is the ground plan itself, the topographical "style," which is different.

In pre-telescopic times, and even during the first century or so of telescopic observation, these differences in "style" did not appear so marked. Hence the lunar map is full of "terrestrializing" names which produce a false sense of similarity. The darkish spots one can see with the naked eye were named *maria,* seas, and it was there where fancy nomenclature had a grand time. One of the maria was conjectured to be a Cloudy Sea *(Mare nubium),* another a Serene Sea *(Mare serenitatis),* a third a Stormy Ocean *(Oceanus procellarum).* There is a Rainbow Bay *(Sinus iridum)* on the lunar map and a Misty Swamp *(Palus nebularum).*

The other lunar features do not have such fancy names, just because they are smaller in size and were not discovered until later, when astronomers had already realized that the Moon could not be compared with the Earth in such a direct manner. There are five types of lunar formations. The large and strangely smooth darkish maria, once believed to be seas and then the bottoms of ancient seas, are one type. The second and in certain respects most puzzling type are the numerous ringwalls or craters which range all the way from gigantic "walled plains"—of which Clavius is a fine example—to "normal" Moon craters like Copernicus, and small "craterlets" to tiny "beads." The third type are mountain chains like those "Alps," "Apennines" and "Caucasus" around the *Mare Imbrium.* The fourth are strange deep chasms or channels, often called *rills* by astronomers, in adaptation of the German appellation *Rille* which means "groove." The fifth type, finally, are the "rays" which radiate from some craters, mainly Tycho and Copernicus, bands of higher luminosity which cross other craters, mountains and maria with great impartiality, as if they were actually immaterial "rays" but they obvi-

ously have to have a material nature.

Even this simple accounting of the five principal features—four of which are strange—gives an idea of the difficulties confronting any attempt at explanation. Most of the surface features of the Earth owe their existence or their shape to weather in one way or another—but there is no weather on the Moon. What seemed at first glance like a simplification of the problem turns out to be a serious handicap. The only lunar "weather" we know of is the monthly day-and-night period, amounting, in terms of surface temperature, to a regular cycle with two extremes which are about four hundred fifty degrees in temperature and two weeks in time apart from each other. Such weather can cause the cracking of surface rocks and it is quite likely that considerable portions of the lunar surface are covered with a kind of gravel of varying grain size, only a few inches deep. That cannot account for much and is a very secondary factor of which we do not even have any direct telescopic evidence.

The bigger forms which we see through our telescopes are obviously the final result of developments which took place in the past when there was, presumably, weather and activity on the Moon. The question, the real question, is what kind of weather and what kind of activity.

The early interpreters, especially Kepler, were not troubled by such a conception. At a time when it was the unspoken belief that our atmosphere extended to the Moon the question of weather could not come up. And although Kepler himself came to the conclusion that this belief could not be harbored, since that would have meant friction and the solar system could function only if there was no friction anywhere, he still had no reason to doubt that the Moon had its own atmosphere and its own weather.

Nor did he have any scruples assuming the existence of selenites, or Endymionides, as he called them. In fact the first evidence presented by the newly invented telescope at the very beginning of the second era of astronomy worked hand in hand with that belief. The telescope showed what looked like large numbers of tiny little circles, evidently large holes, situated around larger "hollows," the maria. And thus Kepler wrote:

"Those hollows of the Moon first seen by Galilei are . . . portions below the general level, like our oceans. But their appearance makes me judge that they are swampy for the greater part. It is there where the Endymionides find the sites for their fortified cities which protect them against the swampiness as well as against the heat of the Sun, possibly also against enemies. They do it in the following manner: in the center of the chosen site they put a stout pole to which they attach ropes, their length depending on the size of the fortress to be built; the longest (rope) measures five German miles (about twenty miles). Then they mark the periphery by walking around at the end of the rope. After that they amass to build the wall . . . Whenever the inhabitants feel annoyed by the power

of the sun those who live near the center move into the shadow of the outer wall . . . following the shadow for fifteen days they wander about and by this means endure the heat."

It was an obvious idea for a time when people themselves lived in walled cities because of enemies, where they were plagued by the heat of the summer as well as by the dampness of winter.

But Kepler lived to see only the first moments of the second era of astronomy and it was left to his compatriot Johannes Hevelius to explore the Moon with the new instrument. The result was a monumental work called *Selenographia* which appeared in 1647 and which contained, among other things, evidence of lack of noticeable—or even visible—bodies of water on the Moon as well as statements about the lack of an atmosphere, at least if the term were understood in the terrestrial sense. Hevelius was definite enough to influence even the Frenchman Bernard de Fontenelle, who—in 1686, if you care to know the date—claimed that all worlds were inhabited by inhabitants adapted to the conditions of their respective worlds to make an exception in the case of the Moon. The Moon, de Fontenelle declared, might not be inhabited *à cause de la rareté de l'air.*

Quite naturally interest in the Moon flagged for a considerable period and it was not until the nineteenth century that astronomers again energetically pursued the work started by Hevelius. But there were first a number of strange interludes.

One of them is connected with the rather strange name of a strange man, the astronomer Franz von Paula Gruithuisen of Munich. (The pronunciation, if you feel inclined to try, is: Frants fon Pow-la Khroyt-hoy-zen.) Gruithuisen had strange and unusually fantastic ideas, but it has to be said that he did not follow the occult method of substituting afternoon naps with accompanying visions and revelations for serious research. He worked and worked hard, and had a well-grounded reputation as observer. He could make decent drawings, too. Of all the people who observed the Moon it would be just Gruithuisen who stumbled across a real mystery. In the late evening of July 12, 1822, he carefully studied the vicinity of one of those mysterious chasms or *rills,* the one called the Hyginus rill because it runs through the crater Hyginus in the Southern portion of the *Mare vaporum.*

There is a strange formation near the Hyginus rill. Some astronomers refer to it as Snail Mountain, because it looks somewhat like the upper portion of a huge snail that was trapped in tar. There are the upper ridges of other mountains in the vicinity, also looking as if their lower portions had been buried in something viscid which later hardened. The whole looks strange enough to seem artificial—and Gruithuisen did not hesitate for a moment to say that it was artificial. At last, he proclaimed, we

are on the trail of the selenites, we can see an old and abandoned structure, obviously an old fortress, guarding the entrance to an abandoned city!"

The discovery caused an enormous stir, as it would even today. But after an interval of breathlessness other observers, especially Mädler, declared that Gruithuisen's imagination had made him see things that did not really exist. Where Gruithuisen's had drawn the walls of a fortress and ruins of a city Mädler just drew a number of minor mountain ridges crossing each other. It is fair to say that Mädler exaggerated as much in one direction as Gruithuisen had exaggerated in the other. The mysterious spot is not a ruined city as drawn by Gruithuisen, but it is not as featureless as drawn by Mädler either. It does not need a large telescope to see it—and the more you look at it the less does it "make sense" one way or another. Alone the fact that there is apparently something buried in something once liquid is hard enough to swallow. What is the substance that once was liquid? It could not have been water which is now ice. Its color is too dark, and if it were darkish rock dust over a layer of ice the rock dust would heat up sufficiently during the lunar day to melt the ice. If it was lava, where did it come from?

Gruithuisen's *Wallwerk*, as he called it, is not that, but we'll not be able to tell what it really is until we get there.

After the storm about the *Wallwerk* there came another and in some respects even stranger interlude, the discussion about the alleged nonspherical shape of the Moon. The father of that idea was Peter Andreas Hansen, a Danish watchmaker who, via a job as assistant surveyor in the Danish Survey, became connected with the then new observatory in Altona and was, in 1825, called to the famous University town of Gotha as director of the Seeberg observatory. There he distinguished himself greatly in theoretical work. One of his papers, on the mutual perturbations of Jupiter and Saturn, won a prize from the Berlin Academy, another one on the orbits of comets won a prize from the Paris Academy while his Tables of the motions of the Moon were printed at the expense of the British Government and embodied in the Nautical Almanac. The Royal Astronomical Society awarded him a gold medal, the Royal Saxonian Academy of Sciences considered it a privilege to print his works. Hansen's fame was, as can readily be seen, international and well deserved and when he announced that he had a novel conception of the Moon everybody listened attentively.

The mainstay of Hansen's thesis was the fact that we see only one side of the Moon since the Moon's motion is about that of a barking dog jumping around a man. All he can see is the open mouth and bared inhospitable teeth. If one did not know the appearance of a dog, one might, because of that impression,

picture it as a monster consisting of jaws and teeth, with some minor and ill-defined appendages.

Astronomical research about the Moon has disclosed, Hansen said—without any such reference to dog-monsters—that the air is too thin to be detected, a fact which is popularly expressed by saying "no air." It has failed to show the presence of water. All it does show is a collection of silent craters, bleak mountain ridges and desolate mare plains. All in all the picture of a forbidding inhospitable world. There is no doubt that this picture is correct, *but there is no reason to believe that it applies to all of the lunar world!* It applies to the half we can see, it does not necessarily have to apply to the invisible half, too. In fact, Hansen said, there is good reason to believe that it doesn't. Certain peculiarities in the behavior of the Moon indicate that it is not spherical at all, but that its shape should be compared with an egg, the long axis of which is pointing toward the Earth.

What we see is the pointed end of the egg-shaped moon, so-to-speak a gigantic mountain, rising hundreds of miles above the ideal but nonexistent spherical surface of the neighboring world. Naturally there is no atmosphere, that gigantic "mountain" is higher than the lunar atmosphere. Naturally there is no water, any water that ever might have been there had flown over the rim to the lowlands of the "other side." And these lowlands are apt to be moist, with a flourishing vegetation, with animals

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that have a life-rhythm adapted to the long cycle of lunar day and night, possibly even with those selenites Professor Gruithuisen has been looking for more or less in vain all these years.

The dog, to return to my own picture, with snarling lips and inhospitable teeth in front, did have a friendly rear end too, only we can't see it because of his peculiar motion around us.

It was an intriguing idea and, almost needless to say, stories were written around it, one, by a Polish author, as late as 1911. (Fritz Lang, in his space-travel movie *"Frau im Mond,"* revived part of Hansen's idea for the very simple practical reason that it permitted the actors to shed their spacesuits.) For a while everybody was intrigued, but then critics arose. The most important of them was Simon Newcomb and Newcomb actually succeeded in proving that even Hansen could make mistakes and that the Moon is at least as spherical as the Earth. And one German observatory, just because of Hansen, inaugurated a special study of "the other side." Since the Moon's motion is irregular it seems to "wobble" a bit, called *libration* in dignified language. This libration permits to see small parts of the "other side" at regular intervals so that the total of the Moon's surface which we can see is not precisely one half, as should be expected, but about four sevenths. That special study agreed with Newcomb and not with Hansen, that what we can see of the "other side" is of the same type, or types, which haunt us on our side. The Moon is "all teeth."

After Hansen's "Moon Mountain" had come crashing down astronomers set out in great seriousness to explain what they saw. That explanation still sticks in the minds of quite a number of people and when you stand for some time near the large lunar photographs in the Hayden Planetarium—or any other—you'll be able to overhear some father displaying his learning to his wife and half-grown children in about the following manner:

"These big smooth areas you see there are the so-called mare, in former times this was all ocean, but now they are dry. All these little circles are extinct craters, that must have been some volcanic display when they were still active. Those little lines are deep chasms like our Grand Canyon. Down there you have real mountains like the Rockies. And those white "rays" that emanate from some craters are cracks, the volcanism must have been bad enough to crack the whole Moon. Then lava came up in the cracks and lava looks brighter than other rocks."

All of which is perfectly good astronomical conjecture, only it happens to be slightly old-fashioned, by about seventy years. The whole explanation, you may have noticed, works with past volcanism and former weather. Former seas, former rivers cutting deep canyons into the rock, former weather eroding former volcanic craters. The

important, but usually neglected, point is that the lunar craters, even if they were volcanic in origin, would have to be conceived as eroded craters. No active volcanic crater looks even remotely like the average Moon crater, but an old and extinct crater on which erosion went to work for some ten thousand years or so, *might* resemble a lunar crater. In order to maintain the volcanic hypothesis you would have to assume that lunar volcanism stopped at a time when the atmosphere was still dense and moist so that it could cause considerable erosion.

I cannot help but feel that the whole volcanic hypothesis owes its existence to the semantic compulsion of the term "crater." Some dunderhead in the past thought that "crater" would be a nice convenient word for the ringwalls of the Moon and since then a long series of other dunderheads spent their lives trying to prove that the things they called craters actually *were* craters.

If you call them ringwalls to begin with and then study their size and shape carefully, you'll soon begin to wonder why anybody ever even dreamed that they could have volcanic origin. The diameters of the vast majority run between thirty and one hundred twenty miles. The floor of the ringwalls is always lower than the general level of the surrounding moonscape, in about fifty percent of all cases it shows a central mountain, in the other fifty percent the floor is virtually smooth. If there is a central mountain, its height is always such that it about reaches to the level of the surrounding moonscape. If either the ringwall itself or the floor shows a noticeable interruption, it is usually a smaller ringwall of the same general type.

As regards the volcanic hypothesis: the "craters" are far too large to begin with, even considering the lesser gravity of the Moon. If the ones without a central mountain were weathered down, you would naturally expect that the interior is considerably above the general level of the surrounding moonscape, filled with débris from the crater wall. Those with a central mountain would then be craters of the type you occasionally find on Earth, with a "young" active crater inside the old rim. But then the younger crater should be considerably higher than the old eroded ringwall and the floor, again, should be considerably above mean Moon level. And that a secondary young crater should break through the old ringwall, just at the spot where a lot of additional weight is piled on, is a harder strain on the imagination than one could reasonably be expected to stand.

Unbiased examination of the available data *had* to lead to the result that the lunar craters, in spite of their misleading designation, could not be volcanic in origin, unless you invented a special and impossible variety of volcanism to suit the observations.

There existed an alternate hypothesis, invented by, of all people, old Gruithuisen. At one point of

his writings he had mentioned, very much by-the-way, that the lunar craters looked like impact craters caused by cosmic matter. A little later a mining engineer by the name of Althans, who had witnessed the famous life struggle of ordnance engineers—i.e. first to devise an armor plate that will stand all known projectiles and then to design a gun that will pierce that plate—arrived at the same conclusion, presumably without having read Gruithuisen. He even tried to experiment, using balls of grapeshot as meteorites and shallow pans filled with fresh mortar as the lunar surface.

The first well-known astronomer to subscribe to the meteoric hypothesis was R. Proctor, some fifty years ago. Slowly the party of adherents to the meteoric hypothesis grew and when the meteoric origin of comparable objects on Earth—especially Meteor Crater in Arizona—was established the growth of that party accelerated in proportion. What this party lacked was a neat and simple method of demonstrating meteor craters in the laboratory.

They got that method in 1918, and it is hardly surprising to learn that it was not devised by an astronomer or physicist but by a geologist. His name was Dr. Alfred Wegener, the same who later acquired fame as originator of the theory of continental drift.

The type of experiments originated by Althans had rarely led anywhere, obviously because laboratory conditions could not duplicate the actual event well enough. In one case you had a leaden or rubber ball, hitting a "batter" of cement or mortar with something like three feet per second, in the other you had a hunk of iron or rock, weighing scores of tons and striking the ground with a velocity of some twenty miles per second or more. You got a much truer picture of a lunar ringwall for a split second by dropping a drop of cream into a cup of coffee; the coffee, at least, did not have the annoying coherence of mortar.

The answer was in that last statement. In general one may distinguish between two types of forces, molecular forces—the strength of the material—and mass forces — gravitation — as Wegener called them. Both types of forces were present both in the laboratory and in actuality, *but in an entirely different ratio!* In the laboratory the "molecular forces" were relatively enormous and the mass force of gravitation appeared mainly as a nuisance. In an actual meteor crash the molecular forces—tensile strength of the material of the meteorite—did not count at all, the hardness of steel is as unimportant as the brittleness of rock when it comes to collisions at twenty miles per second. In order to imitate such a collision in the laboratory one had to find a material of *no tensile strength!*

There are such materials, fine powders of any kind. Wegener chose cement powder for purely practical reasons, it comes in uni-

form quality and the results can afterwards be hardened by spraying with water. Both the "meteorite" and the "surface" were dust, simply a shallow pan filled with cement dust and a soup spoonful of cement powder that was dropped on that "surface" from a height of about forty inches. The experiment is so simple that anybody can repeat it any time, the only thing that is wrong with it is that cement dust is rather dirty to work with.

The results are amazing. The impact craters do not only look like meteor craters, they also show all their characteristics. The floor is always below the general level, it is always smooth, the ratio between the height of the ringwall and the diameter of the whole is the same as that found in the less shallow natural lunar craters, and the average of the measurements of some twenty craters showed almost precisely the same ratio of dimensions as Meteor Crater in Arizona.

The first question that arose was: "What happens to the meteorite?" To answer that question a soup spoonful of plaster of Paris was dropped on a cement surface. The result was a surprise, the crater was white all over. Particles of plaster had spattered across the rim to a distance of about a yard. A cross section showed that the "meteoric matter" was thinnest over the crater floor and somewhat concentrated on the inner side of the ringwall. There was no "main mass" and it is probable that the majority of all large meteorites "disappears" in this manner.

The next question was: "When does a central mountain form?"

At first the experiments refused to answer that question, until one formed accidentally. It was then found that you can always get a central mountain, provided your layer of cement dust is not too thick. It has to be less than an inch. Repetition of the experiment with plaster of Paris and cross sectioning of the model showed that the central mountain was merely ground material that had not been moved outward to form the rim of the crater. This explains why the real central mountains never attain the height of the crater rim but only that of the surrounding level. The rim is ground material piled high, the central mountain is ground material left undisturbed. Translated into large-scale happenings this experiment indicates that a central mountain will form where thick layers of dense rock material can be found not too deeply below the surface. This does not seem to be the case in Arizona, hence Meteor Crater is without a central mountain.

The development of the meteoric hypothesis accounts well for the thirty thousand or so craters we see on the Moon. All those difficulties with which the volcanic hypothesis had to wrestle endlessly, the large size, the smooth crater floor, smaller craters in the rim of bigger ones, lack or presence of a central mountain, the ratio of the various dimensions, all this fits well.

The same hypothesis can account for the maria too. *Mare Crisium*, as a quick look at any photograph will show, is simply a "super-gigantic" Moon crater. So is the *Mare Imbrium* and its mountain chains, the Alps, Apennines, et cetera, turn out to be merely parts of an enormous ringwall. But in the case of the maria an additional assumption has to be made.

There can be no doubt that a meteorite causing a mare is a sizable planetoid; it has been calculated, for example, that the one responsible for *Mare Imbrium* must have had a diameter of about one hundred twenty-five miles. A collision with a body of such mass does more than just cause an impact crater. It is apt to break through and cause a lava flow of at least as much mass as that of the meteorite. The magma replaced by the planetoid wells up and floods the floor of the enormous crater. It is interesting, in this connection, to look at the later craters that formed on top of that lava flow. The small ones in the center—and a few large ones near the rim—are without central mountain, others near the rim, where the lava flow is presumably rather shallow, do have them.

The general picture that emerges from these considerations is that the Moon is not a world "shriveled with age" as some people delighted in putting it half a century ago. On the contrary, the Moon represents the picture of a world which *expanded* after it was already formed. It expanded because of the addition of very large amounts of cosmic matter, especially those minor planets or moons which resulted in the maria. The strange and otherwise almost inexplicable *rills* are likely a secondary result of that expansion.

Yes, but didn't I knock my own argument out with all the forgoing? Early in this article I said that that discipline of astronomy which deals with the surfaces of the planets *needs* the spaceship as a new instrument of astronomical research. If we know all that, do we really need it for the Moon? No doubt, a spaceship would be nice to have, but how much more could it teach us about the Moon? Except, possibly, to see what Gruithuisen's *Wallwerk* really is.

Even forgetting about the *Wallwerk* which is somewhat boring after a century of discussion, and forgetting also about the "other side" which is rather too obvious an argument, the answer is still "yes." With emphasis! There are many things we would like to know and never will know unless we get there.

The *Mare Imbrium* has been mentioned so often before, let's start there again. Just north of the *Mare Imbrium*—that is "down" on an astronomical photograph—there is the walled plain called Plato. The normal thing regarding the appearance of a lunar crater during a lunar day is this: when the sun rises for the crater the ringwall stands out in bright illumination, then the central mountain, if

any, while the floor is still in a deep shadow.

Gradually the floor is illuminated by the sun too, save for those portions in the direct shadow of the ringwall. As the terminator advances the shadow shortens and when the sun is in the zenith for that crater everything is an almost featureless white, things are hard to see just because there are no shadows now. As for Plato the beginnings of a day are the same. But as the terminator progresses and the sun rises higher the floor gets *darker*. On photographs taken at what is almost high noon for that section of the Moon, Plato looks like an inkspot; people who did not know about that have asked me seriously whether that spot was a flaw in the plate.

Evaporation of moisture forming a light-absorbing mist? Or just melting ice? I would very much like to know. But it would take a spaceship to get a reliable answer.

Some seventy miles west of Plato, in the middle of the "Alps," you suddenly come across the Great Valley, about ninety miles long and up to six and one half miles wide. The mountains of the "Alps" rise up to twelve thousand feet over the bottom of the Great Valley which is perfectly smooth as far as we can make out. There is absolutely no explanation for the Great Valley except one: that a meteorite of more than six miles diameter hit the Moon at so shallow an angle that it plowed through the Alps before it fell down elsewhere. We don't know where, but you can find

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DOC SAVAGE

AT ALL NEWSSTANDS

craters lying in the direction of the Great Valley on either side, which, of course, may be accidental and have nothing to do with the projectile in question.

On Earth we have several meteor craters which we can study in detail and at leisure. But we don't have anything like a valley literally shot out of a mountain chain by a large meteorite. The Great Valley deserves detailed study. But we can't do it from here!

There are some interesting mountains—not ringwalls—sticking out of the lava flow of the *Mare Imbrium*, for example Pico, just south of Plato. Are they really mountains? Or volcanic upheavals? We can't tell until we get there.

North of the *Mare Imbrium* there is Eratosthenes. Eratosthenes would be just a medium-sized, very beautiful and very typical crater, if it were not for William Pickering who observed repeatedly strange grayish spots moving around inside the crater. Cloud formations betraying the presence of moisture? Or lunar vegetation, springing up and being killed by the heat of the sun with great rapidity? Or swarms of lunar insects, equivalents of terrestrial locusts? Or simply eyestrain?

We'll never know until we get there.

Not far from Eratosthenes there are the fine craters of Copernicus and Kepler, both showing typical patterns of "rays." The "rays," that much is clear, are evidently streaks of fine particles shot to a considerable distance when the craters were formed. It is quite likely that the material that causes them is so thinly spread that you could walk across a "ray" on the Moon without ever knowing it. Fine, but why do only a few craters have systems of "rays"? One astronomer advanced the very interesting hypothesis that they are the craters formed by large iron meteorites, that the "rays" are volatilized metal. Rock dust evidently is not apt to show much; the explanation is fascinating and corresponds with terrestrial evidence. The Arizona crater is the result of an iron meteorite and small globules of iron have been found around it. It would be interesting to see wehther Meteor Crater, seen from space, shows "rays."

Before jumping to the South Pole of the Moon we have to make a detour into the *Mare Serenitatis* for Linné, named after the famous Swedish biologist and systematizer Linnaeus.

Linné is merely a grayish-whitish spot, not clearly defined and looking alike all through the lunar day, i.e. too shallow to cast a shadow. Some observers stated that a tiny hole can be seen in the center of that spot, provided the telescope is large and the seeing conditions are more than just fine. This is a modern description, made after 1900. But Schmidt, in 1843, claimed that Linné was a crater about six miles in diameter and some twelve hundred feet deep. And he and others of his time used Linné as a fixed point for measuring distances since it stood so neatly alone in the mare.

It still stands neatly alone, but nobody in his right mind would use such an ill-defined object for this purpose. Question: is Linné a real volcano which was active some time between about 1860 and 1890?

We won't be able to tell, et cetera.

Near the South Pole there are more nice points of interest. There is Clavius, an enormous walled plain measuring well over one hundred fifty miles in diameter. Clavius is, no doubt, old. Seven big and a large number of smaller meteorites have scored direct hits on its walls in the meantime. The troublesome point is this: these newer craters are not only newer because they are superimposed on Clavius' ringwall, they also *look* newer. Is Clavius old enough to go back to a time where there was erosion as we know it? (The same question can be asked about some other walled plains, too. Yes, why only walled plains? Or mostly walled plains? Why not smaller craters?)

And then there is Wargentin, lying so close to the SE rim that it is hard to see most of the time. Wargentin is a forty-five-mile crater that is filled to the rim. What happened? If the meteorite that formed it broke through and caused a lava flow, why did not the lava melt the ringwall in some place? How could such a clearly defined ringwall form at all if the meteorite broke through? The only suggestion I can think of is that Wargentin was formed in the approved manner and that a later hit inside it broke through. This idea does not make me completely happy, it is merely the best I can think of right now. Meanwhile the "thin cheese" as Nasmyth and Carpenter called Wargentin, will continue to haunt me.

And then we have the Railroad on the Southern hemisphere, also called the Straight Wall. Location: in *Mare Nubium* near crater Thebit, west of the crater, to be precise. (East of it, to make things a little more mysterious, is a slightly curved rill, shorter than the Straight Wall, but running parallel to it.) The Straight Wall is about seventy miles long, one thousand to two thousand feet high, showing as a black line part of the lunar day—shadow—and showing as a very *white* line otherwise. For the sake of the filing index the Straight Wall, also called the Railroad, has been put down as a rock fault. We do have rock faults on Earth, but they are much shorter and I still have to hear of one that is as straight as the Straight Wall.

I think the Straight Wall, too, will be reserved for the coming third era of astronomy.

THE END.

★ ★ ★ ★ ★

PROBABILITY ZERO

AGRICULTURAL GEOLOGY

by

George Holman

"More than most people notice, the way they live depends on the geology o' the country they live in," Hardluck Hadley said, as we left Custard City behind and plodded northward along the gloomy trail toward the Carbohydrate Mountains. For the reason that he was familiar with the topography and geology of Venus, I had signed up the unlucky old prospector as a partner.

Hardluck pointed to a Colonist at work in an artificially lighted field nearby. "Take that farmer an' size him up with a farmer back on Earth," he suggested. "The farmer on Earth grows grain, tubers, fruits an' vegetables. He fertilizes his ground with limestone dust, phosphates an' nitrates. But that farmer here on Venus grows macaroni, cream puffs an' soft-nosed pies. An' fur fertilizer he uses spices, eggs an' rock sugar frum the mines o' Saccharita."

"Over in Pristine Province farmin' is different yet," the old sourdough went on. "There the primordial rocks come near croppin' out, an' in places the soil is hematite or limonite. Both are friable iron ores. One time I staked out a homestead on some hematite land, an' tried to raise soft-nosed pies. But the crusts o' my first crop o' pies turned out to be cast iron. Then I tried to raise macaroni. It turned out to be small steel tubes. Then I hit on the idea o' raisin' ball bearin's. I planted a small field, an' got a bumper crop. As you know, they grow in long round pods on vines, like peas."

"I was figgerin' on gittin' rich raisin' ball bearin's fur all the machinery here on Venus when another problem popped up. I didn't have time to sell my crop before they started to rust. Soon they was pitted an' spoiled. I took this loss.

an' set out to make my bearin's rustproof. I ordered chromite from Luzon, an' fertilized a small plot o' my hematite land with it an' some nickel ore an' carbon. The bearin's I raised on this plot turned out stainless. I ordered enough chromite fur my whole farm, an' planted it all in bearin's."

"I hired coolies to hull my first two crops by hand. But with my whole homestead in ball bearin's, I needed a machine to thrash them. I mortgaged ever'thing I had to git the money fur a thrashin' rig. I sent my order to a firm on Earth, an' by harvest my bearin' separator an' separate smasher-powered engine was delivered."

"My orderin' that thrasher let my plans be known, an' the ball bearin' manufacturers on Earth plotted my downfall. My shipment o' fertilizer was late, an' I had it spread at once. The chromite looked darker an' heavier than the last shipment, but I was in too big a hurry to run a test on it."

"About a week later I noticed that ever' bearin' pod had lined itself in a northwest-southeast direction. I was puzzled till I remembered that Pristine Province is in a direct line between the two main magnetic poles o' Venus. My ball bearin's had become magnetized. I examined my fertilizer I had left over. I opened one of the drums labeled 'Chromite.' There was no chromite about it. It was magnetite."

"I couldn't see where the bearin's bein' magnetic would damage them. So I got ready to thrash them. My coolies fed the vines into the separator, an' the blower blowed them out. But nary a bearin' rolled out. I had figgered out that the magnetized bearin's was stickin' to the iron parts o' the machine, when the whole separator suddenly turned around. The belt flew off as it made for the engine, like a magnet attracted toward steel."

"No sooner did my Venusian engineer see the separator move than he give the engine the gun. The smashers roared out, an' the engine raced away across the fields. The separator full o' magnetized bearin's was right behind it. The engineer raced the engine this way and that tryin' to git away frum that infernal separator gone loony. But it was no use. The engine had to run over some bearin' vines, an' both bearin's an' loose pods stuck to it. At last the engine bogged down, an' the separator went into it like a buttin' goat. The atom-smashers must have exploded, 'cause that was the last we saw of either machine 'ceptin' a cloud o' smoke."

"Fur a week after the explosion ball bearin's rained down like hailstones all over Venus," the old sourdough concluded.

THAT'S A LOT OF HOT AIR!

by

Francis Wilson Powell

"Yes, sir," the brisk, young clerk chirped, "a fine new wagon in exchange for your auto? Or would you rather take this jaunting car?

It's the latest style, you know."

"I," said the customer, "would like—"

"Oh, you want a sulky, perhaps? Anything to oblige. Now, sir, would you mind telling me just where you found *that?*"

He pointed to the beautiful, eight-cylinder sedan. The customer opened and shut his mouth, but the clerk rattled right on.

"Just sign here. That's fine! We'll deliver in the morning. But, as I was saying, sir, we must put down a good reason for your still having *that* at all. Regulations, you know."

"I," said the customer—

"Oh, I see. You must have been 'way up in the mountains and didn't hear about the new law. Radio broken?"

"I," the customer tried again. "Oh, you young fool! Can't you shut up for a moment?"

"I *beg* your pardon! Of course, sir, you realize that discourtesy to a member of the Bureau of Reclamation and Assessment of New and Used Automobiles for the Promotion of Public Welfare and Safety of the World may result in a heavy fine. But, sir, I'm sure you are not familiar with the laws, so we'll overlook it this time. Now, as you were saying—"

"Look," the customer pleaded, "just take my car; give me the horse and buggy—and l-e-a-v-e-m-e-a-l-o-n-e!"

Leaving the Reclamation Office, the husky customer adjourned to "Ye Olden Coupe" and ordered a row of brandies set up on the bar. After consuming the first six, he fell into conversation with a barfly.

"Tell me, sonny," he begged, "what's all this idiotic monkey business about having to swap in your car for a horse and wagon? I've been out of town a long time."

The barfly fumbled in his pocket. "Got change for a twenty?" he asked.

"All right," said the customer, "I'll buy you a drink. Now, let's have it."

"Well, hrrrmmm! It's a long story. My, that was smooth brandy!"

The customer bought him two more and listened. Eventually, the story unfolded.

It seems that, a few months back, the World Government came to the conclusion that the weather was gradually changing—at an accelerating pace. In seeking the reason for this, research men investigated all possible factors.

It came to their attention that the consumption of petroleum had increased ten times during the war and had persisted at this rate for the past ten years—making a grand total of nearly thirty billion tons. Now, while the Earth itself was believed to weigh six sextillion, six hundred quintillion tons, it can be appreciated that the consumption of petroleum was rapidly becoming a large portion of the Earth's weight.

"So, you see," said the barfly, "that is a very serious matter."

"No, I don't see," the customer replied.

"Why, of course," the barfly retorted, "they had to forbid the use

of petroleum. Every time you burn oil in your auto, you turn the heavy liquid into light gases. As billions of tons of gas escape, the weight of the Earth is lessened—and this is throwing the Earth out of its orbit."

"Oh," weakly answered the customer.

APPLESAUCE

by

George W. Hall

On the way to his reward, Newton's spirit stuck his head out to test the ether drift. He was rather brutally yanked out, caught in a space-time warp.

His robe somewhat awry, he landed on a planet belonging to a twin-sun system on one of the galaxies. A native shaped like a cross between a lobster and a robot bomb was squatting on the nickel-iron ground, browsing on polar magnetic line forces which he snapped like taut elastic bands and ate like spaghetti.

"Tell me all about yourself!" telepathed the native, amicably offering the newcomer a few choice bits of meteorite. "My name is QZZZ-000¼ and this is planet V-2."

Politely Newton refused but began talking: "My name is Newton and I come from Earth."

QZZZ-000¼ was a wonderful listener and Newton let himself go.

"One thing strikes me in the history of man upon your planet Earth and that is the marvelous role that apples played in the development of the race," mused QZZZ-000¼ when Newton finally ran down. All you told me about your discovery of the laws of gravitation, differential calculus and the corpuscle theory of light, I understand easily; but that matter of the apples is beyond my comprehension. Tell me more about the apple!"

"The apple?" Newton was nonplused. "Oh, you mean the one that fell and got me to thinking! Why, it was just an apple . . . a fruit, you know . . . red . . . I remember picking it up afterwards and it was wormy— Ah, me! An apple orchard in the spring!"

"It is extraordinary," said QZZZ-000¼ but I cannot see it. But an

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apple must be the most wonderful machine! What about that Adam and Eve business? It changed your world, didn't it? And then that William Tell affair! It changed the world again!"

"As a matter of fact, yes," admitted Newton.

"And you say it is a small round thing without tubes, without electronic or atomic elements of power?"

"Yes. Just a fruit. We eat it."

"Liar!"

"Sir?"

"Liar! A thing like that could not change the destiny of a race."

"I do not like being called a liar, sir. If I had some way to—"

"Got you there! If it is as you say, I will apologize. Take hold of my claw while I adjust this slide on my antenna. Third planet in single sun system, Milky Way Galaxy, I believe you said. The space-time warp is simple. Let's go!"

And so, instantly, they found themselves in an orchard on Earth and the year was 1944. The apples were ripe, red and round.

"Sit still," said Newton, "one must fall presently and you will understand."

Three days passed and no apple fell.

"Same old story," growled QZZZ-000¼, "no matter where they come from they are all liars!" He adjusted his antenna and disappeared.

Two little boys came in the orchard and began digging for worms.

"Gee!" said the smallest, "I'd like an apple!"

"Pa got them all counted with the radar," said the other, "and don't try climbing either, the electric eye is watching."

"Don't they never fall?" queried the first boy.

"Heck, no! They have been sprayed with that hormone dope that prevents dissolution of the abcission layer between the fruit stem and the spur!"

"Heck!" said the first boy.

"Heck and double Heck!" muttered Newton as he began his long flight up once more.

THE END.

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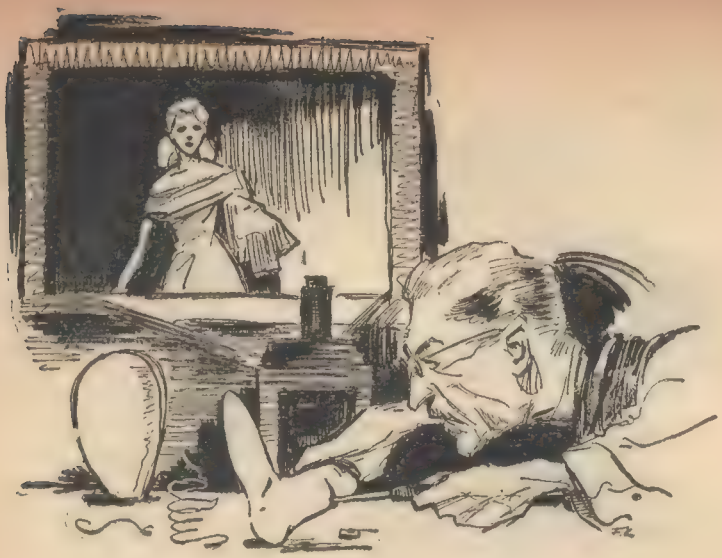

No Woman Born

by C. L. MOORE

She had been beautiful—before the fire. Now she was living again, in a sense, but as a robot. Could personality show through a robot . . .

Illustrated by Kramer

She had been the loveliest creature whose image ever moved along the airways. John Harris, who was once her manager, remembered doggedly how beautiful she had been as he rose in the silent elevator toward the room where Deirdre sat waiting for him.

Since the theater fire that had destroyed her a year ago, he had never been quite able to let himself remember her beauty clearly, except when some old poster, half in tatters, flaunted her face at him, or a maudlin memorial program flashed her image unexpectedly across the television screen. But now he had to remember.

The elevator came to a sighing stop and the door slid open. John Harris hesitated. He knew in his mind that he had to go on, but his reluctant muscles almost refused him. He was thinking helplessly, as he had not allowed himself to think until this moment, of the fabulous grace that had poured through her wonderful dancer's body, remembering her soft and husky voice with the little burr in it that had fascinated the audiences of the whole world.

There had never been anyone so beautiful.

In times before her, other actresses had been lovely and adulated, but never before Deirdre's day had the entire world been able to take one woman so wholly to its heart. So few outside the capitals had ever seen Bernhardt or the fabulous Jersey Lily. And the beauties of the movie screen had had to limit their audiences to those who could reach the theaters. But Deirdre's image had once moved glowingly across the television screens of every home in the civilized world. And in many outside the bounds of civilization. Her soft, husky songs had sounded in the depths of jungles, her lovely, languorous body had woven its patterns of rhythm in desert tents and polar huts. The whole world knew every smooth motion of her body and every cadence of her voice, and the way a subtle radiance had seemed to go on behind her features when she smiled. And the whole world had mourned her when she died in the theater fire.

Harris could not quite think of her as other than dead, though he knew what sat waiting him in the room ahead. He kept remembering the old words James Stephens wrote long ago for another Deirdre, also lovely and beloved and unforgotten after two thousand years.

The time comes when our hearts sink utterly,
When we remember Deirdre and her tale,
And that her lips are dust. . . .
There has been again no woman born
Who was so beautiful; not one so beautiful
Of all the women born—

That wasn't quite true, of course—there had been one. Or maybe, after all, this Deirdre who died only a year ago had not been beautiful in the sense of perfection. He thought the other one might not have been either, for there are always women with perfection of feature in the world, and they are not the ones that legend remembers. It was the light within, shining through her charming, imperfect features, that had made this Deirdre's face so lovely. No one else he had ever seen had anything like the magic of the lost Deirdre.

Let all men go apart and mourn together—
No man can ever love her. Not a man
Can dream to be her lover. . . . No man say—
What could one say to her? There are no words
That one could say to her.

No, no words at all. And it was going to be impossible to go through with this. Harris knew it over-

whelmingly just as his finger touched the buzzer. But the door opened almost instantly, and then it was too late.

Maltzer stood just inside, peering out through his heavy spectacles. You could see how tensely he had been waiting. Harris was a little shocked to see that the man was trembling. It was hard to think of the confident and imperturbable Maltzer, whom he had known briefly a year ago, as shaken like this. He wondered if Deirdre herself were as tremulous with sheer nerves—but it was not time yet to let himself think of that.

"Come in, come in," Maltzer said irritably. There was no reason for irritation. The year's work, so much of it in secrecy and solitude, must have tried him physically and mentally to the very breaking point.

"She all right?" Harris asked inanely, stepping inside.

"Oh yes . . . yes, *she's* all right." Maltzer bit his thumbnail and glanced over his shoulder at an inner door, where Harris guessed she would be waiting.

"No," Maltzer said, as he took an involuntary step toward it. "We'd better have a talk first. Come over and sit down. Drink?"

Harris nodded, and watched Maltzer's hands tremble as he tilted the decanter. The man was clearly on the very verge of collapse, and Harris felt a sudden cold uncertainty open up in him in the one place where until now he had been oddly confident.

"She *is* all right?" he demanded, taking the glass.

"Oh yes, she's perfect. She's so confident it scares me." Maltzer gulped his drink and poured another before he sat down.

"What's wrong, then?"

"Nothing, I guess. Or . . . well, I don't know. I'm not sure any more. I've worked toward this meeting for nearly a year, but now —well, I'm not sure it's time yet. I'm just not sure."

He stared at Harris, his eyes large and indistinguishable behind the lenses. He was a thin, wire-taut man with all the bone and sinew showing plainly beneath the dark skin of his face. Thinner, now, than he had been a year ago when Harris saw him last.

"I've been too close to her," he said now. "I have no perspective any more. All I can see is my own work. And I'm just not sure that's ready yet for you or anyone to see."

"She thinks so?"

"I never saw a woman so confident." Maltzer drank, the glass clicking on his teeth. He looked up suddenly through the distorting lenses. "Of course a failure now would mean—well, absolute collapse," he said.

Harris nodded. He was thinking of the year of incredibly painstaking work that lay behind this meeting, the immense fund of knowledge, of infinite patience, the secret collaboration of artists, sculptors, designers, scientists, and the genius of Maltzer governing them all as an orchestra conductor governs his players.

He was thinking too, with a certain unreasoning jealousy, of the strange, cold, passionless intimacy between Maltzer and Deirdre in that year, a closer intimacy than any two humans can ever have shared before. In a sense the Deirdre whom he saw in a few minutes would *be* Maltzer, just as he thought he detected in Maltzer now and then small mannerisms of inflection and motion that had been Deirdre's own. There had been between them a sort of unimaginable marriage stranger than anything that could ever have taken place before.

"—so many complications," Maltzer was saying in his worried voice with its faintest possible echo of Deirdre's lovely, cadenced rhythm. (The sweet, soft huskiness he would never hear again.) "There was shock, of course. Terrible shock. And a great fear of fire. We had to conquer that before we could take the first steps. But we did it. When you go in you'll probably find her sitting before the fire." He caught the startled question in Harris' eyes and smiled. "No, she can't feel the warmth now, of course. But she likes to watch the flames. She's mastered any abnormal fear of them quite beautifully."

"She can—" Harris hesitated. "Her eyesight's normal now?"

"Perfect," Maltzer said. "Perfect vision was fairly simple to provide. After all, that sort of thing has already been worked out, in other connections. I might even say her vision's a little better than perfect, from our own standpoint." He shook his head irritably. "I'm not worried about the mechanics of the thing. Luckily they got to her before the brain was touched at all. Shock was the only danger to her sensory centers, and we took care of all that first of all, as soon as communication could be established. Even so, it needed great courage on her part. Great courage." He was silent for a moment, staring into his empty glass.

"Harris," he said suddenly, without looking up, "have I made a mistake? Should we have let her die?"

Harris shook his head helplessly. It was an unanswerable question. It had tormented the whole world for a year now. There had been hundreds of answers and thousands of words written on the subject. Has anyone the right to preserve a brain alive when its body is destroyed? Even if a new body can be provided, necessarily so very unlike the old?

"It's not that she's—ugly—now," Maltzer went on hurriedly, as if afraid of an answer. "Metal isn't ugly. And Deirdre . . . well, you'll see. I tell you, I can't see myself. I know the whole mechanism so well—it's just mechanics to me. Maybe she's—grotesque. I don't know. Often I've wished I hadn't been on the spot, with all my ideas, just when the fire broke out. Or that it could have been anyone but Deirdre. She was so beautiful—Still, if it had been someone else I think the whole thing might have failed completely. It takes more than just an uninjured brain. It

takes strength and courage beyond common, and—well, something more. Something—unquenchable. Deirdre has it. She's still Deirdre. In a way she's still beautiful. But I'm not sure anybody but myself could see that. And you know what she plans?"

"No—what?"

"She's going back on the air-screen."

Harris looked at him in stunned disbelief.

"She *is* still beautiful," Maltzer told him fiercely. "She's got courage, and a serenity that amazes me. And she isn't in the least worried or resentful about what's happened. Or afraid what the verdict of the public will be. But I am, Harris. I'm terrified."

They looked at each other for a moment more, neither speaking. Then Maltzer shrugged and stood up.

"She's in there," he said, gesturing with his glass.

Harris turned without a word, not giving himself time to hesitate. He crossed toward the inner door.

The room was full of a soft, clear, indirect light that climaxed in the fire crackling on a white tiled hearth. Harris paused inside the door, his heart beating thickly. He did not see her for a moment. It was a perfectly commonplace room, bright, light, with pleasant furniture, and flowers on the tables. Their perfume was sweet on the clear air. He did not see Deirdre.

Then a chair by the fire creaked as she shifted her weight in it. The high back hid her, but she spoke. And for one dreadful moment it was the voice of an automaton that sounded in the room, metallic, without inflection.

"Hel-lo—" said the voice. Then she laughed and tried again. And it was the old, familiar, sweet huskiness he had not hoped to hear again as long as he lived.

In spite of himself he said, "Deirdre!" and her image rose before him as if she herself had risen unchanged from the chair, tall, golden, swaying a little with her wonderful dancer's poise, the lovely, imperfect features lighted by the glow that made them beautiful. It was the cruelest thing his memory could have done to him. And yet the voice—after that one lapse, the voice was perfect.

"Come and look at me, John," she said.

He crossed the floor slowly, forcing himself to move. That instant's flash of vivid recollection had nearly wrecked his hard-won poise. He tried to keep his mind perfectly blank as he came at last to the verge of seeing what no one but Maltzer had so far seen or known about in its entirety. No one at all had known what shape would be forged to clothe the most beautiful woman on Earth, now that her beauty was gone.

He had envisioned many shapes. Great, lurching robot forms, cylindrical, with hinged arms and legs. A glass case with the brain floating in it and appendages to serve its needs. Grotesque visions, like nightmares come nearly true. And

each more inadequate than the last, for what metal shape could possibly do more than house ungraciously the mind and brain that had once enchanted a whole world?

Then he came around the wing of the chair, and saw her.

The human brain is often too complicated a mechanism to function perfectly. Harris' brain was called upon now to perform a very elaborate series of shifting impressions. First, incongruously, he remembered a curious inhuman figure he had once glimpsed leaning over the fence rail outside a farmhouse. For an instant the shape had stood up integrated, ungainly, impossibly human, before the glancing eye resolved it into an arrangement of brooms and buckets. What the eye had found only roughly humanoid, the suggestible brain had accepted fully formed. It was thus now, with Deirdre.

The first impression that his eyes and mind took from sight of her was shocked and incredulous, for his brain said to him unbelievingly, *"This is Deirdre! She hasn't changed at all!"*

Then the shift of perspective took over, and even more shockingly, eye and brain said, "No, not Deirdre—not human. Nothing but metal coils. Not Deirdre at all—" And that was the worst. It was like walking from a dream of someone beloved and lost, and facing anew, after that heartbreaking reassurance of sleep, the inflexible fact that nothing can bring the lost to life again. Deirdre was gone, and this was only machinery heaped in a flowered chair.

Then the machinery moved, exquisitely, smoothly, with a grace as familiar as the swaying poise he remembered. The sweet, husky voice of Deirdre said,

"It's me, John darling. It really is, you know."

And it was.

That was the third metamorphosis, and the final one. Illusion steadied and became factual, real. It was Deirdre.

He sat down bonelessly. He had no muscles. He looked at her speechless and unthinking, letting his senses take in the sight of her without trying to rationalize what he saw.

She was golden still. They had kept that much of her, the first impression of warmth and color which had once belonged to her sleek hair and the apricot tints of her skin. But they had had the good sense to go no farther. They had not tried to make a wax image of the lost Deirdre. *(No woman born who was so beautiful— Not one so beautiful, of all the women born—)*

And so she had no face. She had only a smooth, delicately modeled ovoid for her head, with a . . . a sort of crescent-shaped mask across the frontal area where her eyes would have been if she had needed eyes. A narrow, curved quarter-moon, with the horns turned upward. It was filled in with something translucent, like cloudy crystal, and tinted the aquamarine of the eyes Deirdre used to have.

Through that, then, she saw the world. Through that she looked without eyes, and behind it, as behind the eyes of a human—she was.

Except for that, she had no features. And it had been wise of those who designed her, he realized now. Subconsciously he had been dreading some clumsy attempt at human features that might creak like a marionette's in parodies of animation. The eyes, perhaps, had had to open in the same place upon her head, and at the same distance apart, to make easy for her an adjustment to the stereoscopic vision she used to have. But he was glad they had not given her two eye-shaped openings with glass marbles inside them. The mask was better.

(Oddly enough, he did not once think of the naked brain that must lie inside the metal. The mask was symbol enough for the woman within. It was enigmatic; you did not know if her gaze was on you searchingly, or wholly withdrawn. And it had no variations of brilliance such as once had played across the incomparable mobility of Deirdre's face. But eyes, even human eyes, are as a matter of fact enigmatic enough. They have no expression except what the lids impart; they take all animation from the features. We automatically watch the eyes of the friend we speak with, but if he happens to be lying down so that he speaks across his shoulder and his face is upside-down to us, quite as automatically we watch the mouth. The gaze keeps shifting nervously between mouth and eyes in their reversed order, for it is the position in the face, not the feature itself, which we are accustomed to accept as the seat of the soul. Deirdre's mask was in that proper place; it was easy to accept it as a mask over eyes.)

She had, Harris realized as the first shock quieted, a very beautifully shaped head—a bare, golden skull. She turned it a little, gracefully upon her neck of metal, and he saw that the artist who shaped it had given her the most delicate suggestion of cheekbones, narrowing in the blankness below the mask to the hint of a human face. Not too much. Just enough so that when the head turned you saw by its modeling that it had moved, lending perspective and foreshortening to the expressionless golden helmet. Light did not slip uninterrupted as if over the surface of a golden egg. Brancusi himself had never made anything more simple or more subtle than the modeling of Deirdre's head.

But all expression, of course, was gone. All expression had gone up in the smoke of the theater fire, with the lovely, mobile, radiant features which had meant Deirdre.

As for her body, he could not see its shape. A garment hid her. But they had made no incongruous attempt to give her back the clothing that once had made her famous. Even the softness of cloth would have called the mind too sharply to the remembrance that no human body lay beneath the folds, nor does metal need the incongruity of cloth for its protection. Yet without garments, he realized, she would

have looked oddly naked, since her new body was humanoid, not angular machinery.

The designer had solved his paradox by giving her a robe of very fine metal mesh. It hung from the gentle slope of her shoulders in straight, pliant folds like a longer Grecian chlamys, flexible, yet with weight enough of its own not to cling too revealingly to whatever metal shape lay beneath.

The arms they had given her were left bare, and the feet and ankles. And Maltzer had performed his greatest miracle in the limbs of the new Deirdre. It was a mechanical miracle basically, but the eye appreciated first that he had also showed supreme artistry and understanding.

Her arms were pale shining gold, tapered smoothly, without modeling, and flexible their whole length in diminishing metal bracelets fitting one inside the other clear down to the slim, round wrists. The hands were more nearly human than any other feature about her, though they, too, were fitted together in delicate, small sections that slid upon one another with the flexibility almost of flesh. The fingers' bases were solider than human, and the fingers themselves tapered to longer tips.

Her feet, too, beneath the tapering broader rings of the metal ankles, had been constructed upon the model of human feet. Their finely tooled sliding segments gave her an arch and a heel and a flexible

forward section formed almost like the *sollerets* of medieval armor.

She looked, indeed, very much like a creature in armor, with her delicately plated limbs and her featureless head like a helmet with a visor of glass, and her robe of chain-mail. But no knight in armor ever moved as Deirdre moved, or wore his armor upon a body of such inhumanly fine proportions. Only a knight from another world, or a knight of Oberon's court, might have shared that delicate likeness.

Briefly he had been surprised at the smallness and exquisite proportions of her. He had been expecting the ponderous mass of such robots as he had seen, wholly automatons. And then he realized that for them, much of the space had to be devoted to the inadequate mechanical brains that guided them about their duties. Deirdre's brain still preserved and proved the craftsmanship of an artisan far defter than man. Only the body was of metal, and it did not seem complex, though he had not yet been told how it was motivated.

Harris had no idea how long he sat staring at the figure in the cushioned chair. She was still lovely—indeed, she was still Deirdre—and as he looked he let the careful schooling of his face relax. There was no need to hide his thought from her.

She stirred upon the cushions, the long, flexible arms moving with a litheness that was not quite human. The motion disturbed him as the body itself had not, and in spite of himself his face froze a little. He had the feeling that from behind the crescent mask she was watching him very closely.

Slowly she rose.

The motion was very smooth. Also it was serpentine, as if the body beneath the coat of mail were made in the same interlocking sections as her limbs. He had expected and feared mechanical rigidity; nothing had prepared him for this more than human suppleness.

She stood quietly, letting the heavy mailed folds of her garment settle about her. They fell together with a faint ringing sound, like small bells far off, and hung beautifully in pale golden, sculptured folds. He had risen automatically as she did. Now he faced her, staring. He had never seen her stand perfectly still, and she was not doing it now. She swayed just a bit, vitality burning inextinguishably in her brain as once it had burned in her body, and stolid immobility was as impossible to her as it had always been. The golden garment caught points of light from the fire and glimmered at him with tiny reflections as she moved.

Then she put her featureless helmeted head a little to one side, and he heard her laughter as familiar in its small, throaty, intimate sound as he had ever heard it from her living throat. And every gesture, every attitude, every flowing of motion into motion was so utterly Deirdre that the overwhelming illusion swept his mind again and this was the flesh-and-

blood woman as clearly as if he saw her standing there whole once more, like Phoenix from the fire.

"Well, John," she said in the soft, husky, amused voice he remembered perfectly. "Well, John, is it I?" She knew it was. Perfect assurance sounded in the voice. "The shock will wear off, you know. It'll be easier and easier as time goes on. I'm quite used to myself now. See?"

She turned away from him and crossed the room smoothly, with the old, poised, dancer's glide, to the mirror that paneled one side of the room. And before it, as he had so often seen her preen before, he watched her preening now, running flexible metallic hands down the folds of her metal garment, turning to admire herself over one metal shoulder, making the mailed folds tinkle and sway as she struck an arabesque position before the glass.

His knees let him down into the chair she had vacated. Mingled shock and relief loosened all his muscles in him, and she was more poised and confident than he.

"It's a miracle," he said with conviction. "It's *you*. But I don't see how—" He had meant, "—how, without face or body—" but clearly he could not finish that sentence.

She finished it for him in her own mind, and answered without self-consciousness. "It's motion, mostly," she said, still admiring her own suppleness in the mirror. "See?" And very lightly on her springy, armored feet she flashed through an enchainment of brilliant steps, swinging round with a pirouette to face him. "That was what Maltzer and I worked out between us, after I began to get myself under control again." Her voice was somber for a moment, remembering a dark time in the past. Then she went on, "It wasn't easy, of course, but it was fascinating. You'll never guess how fascinating, John! We knew we couldn't work out anything like a facsimile of the way I used to look, so we had to find some other basis to build on. And motion is the other basis of recognition, after actual physical likeness."

She moved lightly across the carpet toward the window and stood looking down, her featureless face averted a little and the light shining across the delicately hinted curves of the cheekbones.

"Luckily," she said, her voice amused, "I never was beautiful. It was all—well vivacity, I suppose, and muscular co-ordination. Years and years of training, and all of it engraved here"—she struck her golden helmet a light, ringing blow with golden knuckles—"in the habit patterns grooved into my brain. So this body . . . did he tell you? . . . works entirely through the brain. Electromagnetic currents flowing along from ring to ring, like this." She rippled a boneless arm at him with a motion like flowing water. "Nothing holds me together—nothing!—except muscles of magnetic currents. And if I'd been somebody else—somebody who moved differently, why the flexible rings would have moved differently too, guided by the impulse from another

brain. I'm not conscious of doing anything I haven't always done. The same impulses that used to go out to my muscles go out now to—this." And she made a shuddering, serpentine motion of both arms at him, like a Cambodian dancer, and then laughed wholeheartedly, the sound of it ringing through the room with such full-throated merriment that he could not help seeing again the familiar face crinkled with pleasure, the white teeth shining. "It's all perfectly subconscious now," she told him. "It took lots of practice at first, of course, but now even my signature looks just as it always did—the co-ordination is duplicated that delicately." She rippled her arms at him again and chuckled.

"But the voice, too," Harris protested inadequately. "It's *your* voice, Deirdre."

"The voice isn't only a matter of throat construction and breath control, my darling Johnnie! At least, so Professor Maltzer assured me a year ago, and I certainly haven't any reason to doubt him!" She laughed again. She was laughing a little too much, with a touch of the bright, hysteric overexcitement he remembered so well. But if any woman ever had reason for mild hysteria, surely Deirdre had it now.

The laughter rippled and ended, and she went on, her voice eager. "He says voice control is almost wholly a matter of hearing what you produce, once you've got adequate mechanism, of course. That's why deaf people, with the same vocal chords as ever, let their voices change completely and lose all inflection when they've been deaf long enough. And luckily, you see, I'm not deaf!"

She swung around to him, the folds of her robe twinkling and ringing, and rippled up and up a clear, true scale to a lovely high note, and then cascaded down again like water over a falls. But she left him no time for applause. "Perfectly simple, you see. All it took was a little matter of genius from the professor to get it worked out for me! He started with a new variation of the old Vodor you must remember hearing about, years ago. Originally, of course, the thing was ponderous. You know how it worked—speech broken down to a few basic sounds and built up again in combinations produced from a keyboard. I think originally the sounds were a sort of *ktch* and a *shooshing* noise, but we've got it all worked out to a flexibility and range quite as good as human now. All I do is—well, mentally play on the keyboard of my . . . my sound-unit, I suppose it's called. It's much more complicated than that, of course, but I've learned to do it unconsciously. And I regulate it by ear, quite automatically now. If you were—*here*—instead of me, and you'd had the same practice, your own voice would be coming out of the same keyboard and diaphragm instead of mine. It's all a matter of the brain patterns that operated the body and now operate the machinery. They send out very strong impulses that are stepped up as

much as necessary somewhere or other in here—" Her hands waved vaguely over the mesh-robed body.

She was silent a moment, looking out the window. Then she turned away and crossed the floor to the fire, sinking again into the flowered chair. Her helmet-skull turned its mask to face him and he could feel a quiet scrutiny behind the aquamarine of its gaze.

"It's—odd," she said, "being here in this . . . this . . . instead of a body. But not as odd or as alien as you might think. I've thought about it a lot—I've had plenty of time to think—and I've begun to realize what a tremendous force the human ego really is. I'm not sure I want to suggest it has any mystical power it can impress on mechanical things, but it does seem to have a power of some sort. It does instill its own force into inanimate objects, and they take on a personality of their own. People do impress their personalities on the houses they live in, you know. I've noticed that often. Even empty rooms. And it happens with other things too, especially, I think, with inanimate things that men depend on for their lives. Ships, for instance—they always have personalities of their own.

"And planes—in wars you always hear of planes crippled too badly to fly, but struggling back anyhow with their crews. Even guns acquire a sort of ego. Ships and guns and planes are 'she' to the men who operate them and depend on them for their lives. It's as if machinery with complicated moving parts almost simulates life, and does acquire from the men who use it—well, not exactly life, of course—but a personality. I don't know what. Maybe it absorbs some of the actual electrical impulses their brains throw off, especially in times of stress.

"Well, after awhile I began to accept the idea that this new body of mine could behave at least as responsively as a ship or a plane. Quite apart from the fact that my own brain controls its 'muscles.' I believe there's an affinity between men and the machines they make. They make them out of their own brains, really, a sort of mental conception and gestation, and the result responds to the minds that created them, and to all human minds that understand and manipulate them."

She stirred uneasily and smoothed a flexible hand along her mesh-robed metal thigh. "So this is myself," she said. "Metal—but me. And it grows more and more myself the longer I live in it. It's my house and the machine my life depends on, but much more intimately in each case than any real house or machine ever was before to any other human. And you know, I wonder if in time I'll forget what flesh felt like—my own flesh, when I touched it like this—and the metal against the metal will be so much the same I'll never even notice?"

Harris did not try to answer her. He sat without moving, watching her expressionless face. In a moment she went on,

"I'll tell you the best thing, John," she said, her voice softening to the

old intimacy he remembered so well that he could see superimposed upon the blank skull the warm, intent look that belonged with the voice. "I'm not going to live forever. It may not sound like a—best thing—but it is, John. You know, for awhile that was the worst of all, after I knew I was—after I woke up again. The thought of living on and on in a body that wasn't mine, seeing everyone I knew grow old and die, and not being able to stop—

"But Maltzer says my brain will probably wear out quite normally—except, of course, that I won't have to worry about looking old!—and when it gets tired and stops, the body I'm in won't be any longer. The magnetic muscles that hold it into my own shape and motions will let go when the brain lets go, and there'll be nothing but a . . . a pile of disconnected rings. If they ever assemble it again, it won't be me." She hesitated. "I like that, John," she said, and he felt from behind the mask a searching of his face.

He knew and understood that somber satisfaction. He could not put it into words; neither of them wanted to do that. But he understood. It was the conviction of mortality, in spite of her immortal body. She was not cut off from the rest of her race in the essence of their humanity, for though she wore a body of steel and they perishable flesh, yet she must perish too, and the same fears and faiths still united her to mortals and humans, though she wore the body of Oberon's inhuman knight. Even in her death she must be unique—dissolution in a shower of tinkling and clashing rings, he thought, and almost envied her the finality and beauty of that particular death—but afterward, oneness with humanity in however much or little awaited them all. So she could feel that this exile in metal was only temporary, in spite of everything.

(And providing, of course, that the mind inside the metal did not veer from its inherited humanity as the years went by. A dweller in a house may impress his personality upon the walls, but subtly the walls too, may impress their own shape upon the ego of the man. Neither of them thought of that, at the time.)

Deirdre sat a moment longer in silence. Then the mood vanished and she rose again, spinning so that the robe belled out ringing about her ankles. She rippled another scale up and down, faultlessly and with the same familiar sweetness of tone that had made her famous.

"So I'm going right back on the stage, John," she said serenely. "I can still sing. I can still dance. I'm still myself in everything that matters, and I can't imagine doing anything else for the rest of my life."

He could not answer without stammering a little. "Do you think . . . will they accept you, Deirdre? After all—"

"They'll accept me," she said in that confident voice. "Oh, they'll come to see a freak at first, of

course, but they'll stay to watch—Deirdre. And come back again and again just as they always did. You'll see, my dear."

But hearing her sureness, suddenly Harris himself was unsure. Maltzer had not been, either. She was so regally confident, and disappointment would be so deadly a blow at all that remained of her—

She was so delicate a being now, really. Nothing but a glowing and radiant mind poised in metal, dominating it, bending the steel to the illusion of her lost loveliness with a sheer self-confidence that gleamed through the metal body. But the brain sat delicately on its poise of reason. She had been through intolerable stresses already, perhaps more terrible depths of despair and self-knowledge than any human brain had yet endured before her, for—since Lazarus himself—who had come back from the dead?

But if the world did not accept her as beautiful, what then? If they laughed, or pitied her, or came only to watch a jointed freak performing as if on strings where the loveliness of Deirdre had once enchanted them, what then? And he could not be perfectly sure they would not. He had known her too well in the flesh to see her objectively even now, in metal. Every inflection of her voice called up the vivid memory of the face that had flashed its evanescent beauty in some look to match the tone. She was Deirdre to Harris simply because she had been so intimately familiar in every poise and attitude, through so many years. But people who knew her only slightly, or saw her for the first time in metal—what would they see?

A marionette? Or the real grace and loveliness shining through?

He had no possible way of knowing. He saw her too clearly as she had been to see her now at all, except so linked with the past that she was not wholly metal. And he knew what Maltzer feared, for Maltzer's psychic blindness toward her lay at the other extreme. He had never known Deirdre except as a machine, and he could not see her objectively any more than Harris could. To Maltzer she was pure metal, a robot his own hands and brain had devised, mysteriously animated by the mind of Deirdre, to be sure, but to all outward seeming a thing of metal solely. He had worked so long over each intricate part of her body, he knew so well how every jointure in it was put together, that he could not see the whole. He had studied many film records of her, of course, as she used to be, in order to gauge the accuracy of his facsimile, but this thing he had made was a copy only. He was too close to Deirdre to see her. And Harris, in a way, was too far. The indomitable Deirdre herself shone so vividly through the metal that his mind kept superimposing one upon the other.

How would an audience react to her? Where in the scale between these two extremes would their verdict fall?

For Deirdre, there was only one possible answer.

"I'm not worried," Deirdre said serenely, and spread her golden hands to the fire to watch lights dancing in reflection upon their shining surfaces. "I'm still myself. I've always had . . . well, power over my audiences. Any good performer knows when he's got it. Mine isn't gone. I can still give them what I always gave, only now with greater variations and more depths than I'd ever have done before. Why, look—" She gave a little wriggle of excitement.

"You know the arabesque principle—getting the longest possible distance from fingertip to toetip with a long, slow curve through the whole length? And the brace of the other leg and arm giving contrast? Well, look at me. I don't work on hinges now. I can make every motion a long curve if I want to. My body's different enough now to work out a whole new school of dancing. Of course there'll be things I used to do that I won't attempt now—no more dancing *sur les pointes,* for instance—but the new things will more than balance the loss. I've been practicing. Do you know I can turn a hundred *fouettés* now without a flaw? And I think I could go right on and turn a thousand, if I wanted."

She made the firelight flash on her hands, and her robe rang musically as she moved her shoulders a little. "I've already worked out one new dance for myself," she said. "God knows I'm no choreographer, but I did want to experiment first. Later, you know, really creative men like Massanchine or Fokhileff may want to do something entirely new for me—a whole new sequence of movements based on a new technique. And music—that could be quite different, too. Oh, there's no end to the possibilities! Even my voice has more range and power. Luckily I'm not an actress—it would be silly to try to play Camille or Juliet with a cast of ordinary people. Not that I couldn't, you know." She turned her head to stare at Harris through the mask of glass. "I honestly think I could. But it isn't necessary. There's too much else. Oh, I'm not worried!"

"Maltzer's worried," Harris reminded her.

She swung away from the fire, her metal robe ringing, and into her voice came the old note of distress that went with a furrowing of her forehead and a sidewise tilt of the head. The head went sidewise as it had always done, and he could see the furrowed brow almost as clearly as if flesh still clothed her.

"I know. And I'm worried about him, John. He's worked so awfully hard over me. This is the doldrums now, the let-down period, I suppose. I know what's on his mind. He's afraid I'll look just the same to the world as I look to him. Tooled metal. He's in a position no one ever quite achieved before, isn't he? Rather like God." Her voice rippled a little with amusement. "I suppose to God we must look like a collection of cells and corpuscles ourselves. But Maltzer lacks a god's detached viewpoint."

"He can't see you as I do, any-

how," Harris was choosing his words with difficulty. "I wonder, though—would it help him any if you postponed your debut awhile? You've been with him too closely, I think. You don't quite realize how near a breakdown he is. I was shocked when I saw him just now."

The golden head shook. "No. He's close to a breaking point, maybe, but I think the only cure's action. He wants me to retire and stay out of sight, John. Always. He's afraid for anyone to see me except a few old friends who remember me as I was. People he can trust to be—kind." She laughed. It was very strange to hear that ripple of mirth from the blank, unfeatured skull. Harris was seized with sudden panic at the thought of what reaction it might evoke in an audience of strangers. As if he had spoken the fear aloud, her voice denied it. "I don't need kindness. And it's no kindness to Maltzer to hide me under a bushel. He *has* worked too hard, I know. He's driven himself to a breaking point. But it'll be a complete negation of all he's worked for if I hide myself now. You don't know what a tremendous lot of geniuses and artistry went into me, John. The whole idea from the start was to recreate what I'd lost so that it could be proved that beauty and talent need not be sacrificed by the destruction of parts or all the body.

"It wasn't only for me that we meant to prove that. There'll be others who suffer injuries that once might have ruined them. This was to end all suffering like that forever. It was Maltzer's gift to the whole race as well as to me. He's really a humanitarian, John, like most great men. He'd never have given up a year of his life to this work if it had been for any one individual alone. He was seeing thousands of others beyond me as he worked. And I won't let him ruin all he's achieved because he's afraid to prove it now he's got it. The whole wonderful achievement will be worthless if I don't take the final step. I think his breakdown, in the end, would be worse and more final if I never tried than if I tried and failed."

Harris sat in silence. There was no answer he could make to that. He hoped the little twinge of shamefaced jealousy he suddenly felt did not show, as he was reminded anew of the intimacy closer than marriage which had of necessity bound these two together. And he knew that any reaction of his would in its way be almost as prejudiced as Maltzer's, for a reason at once the same and entirely opposite. Except that he himself came fresh to the problem, while Maltzer's viewpoint was colored by a year of overwork and physical and mental exhaustion.

"What are you going to do?" he asked.

She was standing before the fire when he spoke, swaying just a little so that highlights danced all along her golden body. Now she turned with a serpentine grace and sank into the cushioned chair beside her. It came to him suddenly that she was much more than humanly

graceful—quite as much as he had once feared she would be less than human.

"I've already arranged for a performance," she told him, her voice a little shaken with a familiar mixture of excitement and defiance.

Harris sat up with a start. "How? Where? There hasn't been any publicity at all yet, has there? I didn't know—"

"Now, now, Johnnie," her amused voice soothed him. "You'll be handling everything just as usual once I get started back to work—that is, if you still want to. But this I've arranged for myself. It's going to be a surprise. I . . . I felt it had to be a surprise." She wriggled a little among the cushions. "Audience psychology is something I've always felt rather than known, and I do feel this is the way it ought to be done. There's no precedent. Nothing like this ever happened before. I'll have to go by my own intuition."

"You mean it's to be a complete surprise?"

"I think it must be. I don't want the audience coming in with preconceived ideas. I want them to see me exactly as I am now *first,* before they know who or what they're seeing. They must realize I can still give as good a performance as ever before they remember and compare it with my past performances. I don't want them to come ready to pity my handicaps—I haven't got any!—or full of morbid curiosity. So I'm going on the air after the regular eight-o'clock telecast of the feature from Teleo City. I'm just going to do one specialty in the usual vaude program. It's all been arranged. They'll build up to it, of course, as the highlight of the evening, but they aren't to say who I am until the end of the performance—if the audience hasn't rceognized me already, by then."

"Audience?"

"Of course. Surely you haven't forgotten they still play to a theater audience at Teleo City? That's why I want to make my debut there. I've always played better when there were people in the studio, so I could gauge reactions. I think most performers do. Anyhow, it's all arranged."

"Does Maltzer know?"

She wriggled uncomfortably. "Not yet."

"But he'll have to give his permission too, won't he? I mean—"

"Now look, John! That's another idea you and Maltzer will have to get out of your minds. I don't belong to him. In a way he's just been my doctor through a long illness, but I'm free to discharge him whenever I choose. If there were ever any legal disagreement, I suppose he'd be entitled to quite a lot of money for the work he's done on my new body—for the body itself, really, since it's his own machine, in one sense. But he doesn't own it, or me. I'm not sure just how the question would be decided by the courts—there again, we've got a problem without precedent. The body may be his work, but the brain that makes it something more than a collection of metal rings is *me,* and he couldn't restrain me

against my will even if he wanted to. Not legally, and not—" She hesitated oddly and looked away. For the first time Harris was aware of something beneath the surface of her mind which was quite strange to him.

"Well, anyhow," she went on, "that question won't come up. Maltzer and I have been much too close in the past year to clash over anything as essential as this. He knows in his heart that I'm right, and he won't try to restrain me. His work won't be completed until I do what I was built to do. And I intend to do it."

That strange little quiver of something—something un-Deirdre—which had so briefly trembled beneath the surface of familiarity stuck in Harris' mind as something he must recall and examine later. Now he said only,

"All right. I suppose I agree with you. How soon are you going to do it?"

She turned her head so that even the glass mask through which she looked out at the world was foreshortened away from him, and the golden helmet with its hint of sculptured cheekbone was entirely enigmatic.

"Tonight," she said.

Maltzer's thin hand shook so badly that he could not turn the dial. He tried twice and then laughed nervously and shrugged at Harris.

"You get her," he said.

Harris glanced at his watch. "It isn't time yet. She won't be on for half an hour."

Maltzer made a gesture of violent impatience. "Get it, get it!"

Harris shrugged a little in turn and twisted the dial. On the tilted screen above them shadows and sound blurred together and then clarified into a somber medieval hall, vast, vaulted, people in bright costume moving like pygmies through its dimness. Since the play concerned Mary of Scotland, the actors were dressed in something approximating Elizabethan garb, but as every era tends to translate costume into terms of the current fashions, the women's hair was dressed in a style that would have startled Elizabeth, and their footgear was entirely anachronistic.

The hall dissolved and a face swam up into soft focus upon the screen. The dark, lush beauty of

the actress who was playing the Stuart queen glowed at them in velvety perfection from the clouds of her pearl-strewn hair. Maltzer groaned.

"She's competing with *that*," he said hollowly.

"You think she can't?"

Maltzer slapped the chair arms with angry palms. Then the quivering of his fingers seemed suddenly to strike him, and he muttered to himself, "Look at 'em! I'm not even fit to handle a hammer and saw." But the mutter was an aside. "Of course she can't compete," he cried irritably. "She hasn't any sex. She isn't female any more. She doesn't know that yet, but she'll learn."

Harris stared at him, feeling a little stunned. Somehow the thought had not occurred to him before at all, so vividly had the illusion of the old Deirdre hung about the new one.

"She's an abstraction now," Maltzer went on, drumming his palms upon the chair in quick, nervous rhythms. "I don't know what it'll do to her, but there'll be change. Remember Abelard? She's lost everything that made her essentially what the public wanted, and she's going to find it out the hard way. After that—" He grimaced savagely and was silent.

"She hasn't lost everything," Harris defended. "She can dance and sing as well as ever, maybe better. She still has grace and charm and—"

"Yes, but where did the grace and charm come from? Not out of the habit patterns in her brain. No, out of human contacts, out of all the things that stimulate sensitive minds to creativeness. And she's lost three of her five senses. Everything she can't see and hear is gone. One of the strongest stimuli to a woman of her type was the knowledge of sex competition. You know how she sparkled when a man came into the room? All that's gone, and it was an essential. You know how liquor stimulated her? She's lost that. She couldn't taste food or drink even if she needed it. Perfume, flowers, all the odors we respond to mean nothing to her now. She can't feel anything with tactual delicacy any more. She used to surround herself with luxuries—she drew her stimuli from them—and that's all gone too. She's withdrawn from all physical contacts."

He squinted at the screen, not seeing it, his face drawn into lines like the lines of a skull. All flesh seemed to have dissolved off his bones in the past year, and Harris thought almost jealously that even in that way he seemed to be drawing nearer Deirdre in her fleshlessness with every passing week.

"Sight," Maltzer said, "is the most highly civilized of the senses. It was the last to come. The other senses tie us in closely with the very roots of life; I think we perceive with them more keenly than we know. The things we realize through taste and smell and feeling stimulate directly, without a detour through the centers of conscious thought. You know how often a taste or odor will recall a memory

to you so subtly you don't know exactly what caused it? We need those primitive senses to tie us in with nature and the race. Through those ties Deirdre drew her vitality without realizing it. Sight is a cold, intellectual thing compared with the other senses. But it's all she has to draw on now. She isn't a human being any more, and I think what humanity is left in her will drain out little by little and never be replaced. Abelard, in a way, was a prototype. But Deirdre's loss is complete."

"She isn't human," Harris agreed slowly. "But she isn't pure robot either. She's something somewhere between the two, and I think it's a mistake to try to guess just where, or what the outcome will be."

"I don't have to guess," Maltzer said in a grim voice. "I know. I wish I'd let her die. I've done something to her a thousand times worse than the fire ever could. I should have let her die in it."

"Wait," said Harris. "Wait and see. I think you're wrong."

On the television screen Mary of Scotland climbed the scaffold to her doom, the gown of traditional scarlet clinging warmly to supple young curves as anachronistic in their way as the slippers beneath the gown, for—as everyone but playwrights knows—Mary was well into middle age before she died. Gracefully this latter-day Mary bent her head, sweeping the long hair aside, kneeling to the block.

Maltzer watched stonily, seeing another woman entirely.

"I shouldn't have let her," he was muttering. "I shouldn't have let her do it."

"Do you really think you'd have stopped her if you could?" Harris asked quietly. And the other man after a moment's pause shook his head jerkily.

"No, I suppose not. I keep thinking if I worked and waited a little longer maybe I could make it easier for her, but—no, I suppose not. She's got to face them sooner or later, being herself." He stood up abruptly, shoving back his chair. "If she only weren't so . . . so frail. She doesn't realize how delicately poised her very sanity is. We gave her what we could—the artists and the designers and I all gave our very best—but she's so pitifully handicapped even with all we could do. She'll always be an abstraction and a . . . a freak, cut off from the world by handicaps worse in their way than anything any human being ever suffered before. Sooner or later she'll realize it. And then—" He began to pace up and down with quick, uneven steps, striking his hands together. His face was twitching with a little *tic* that drew up one eye to a squint and released it again at irregular intervals. Harris could see how very near collapse the man was.

"Can you imagine what it's like?" Maltzer demanded fiercely. "Penned into a mechanical body like that, shut out from all human contacts except what leaks in by way of sight and sound? To know you aren't human any longer? She's been through shocks enough al-

ready. When that shock fully hits her—"

"Shut up," said Harris roughly. "You won't do her any good if you break down yourself. Look—the vaude's starting."

Great golden curtains had swept together over the unhappy Queen of Scotland and were parting again now, all sorrow and frustration wiped away once more as cleanly as the passing centuries had already expunged them. Now a line of tiny dancers under the tremendous arch of the stage kicked and pranced with the precision of little mechanical dolls too small and perfect to be real. Vision rushed down upon them and swept along the row, face after stiffly smiling face racketing by like fence pickets. Then the sight rose into the rafters and looked down upon them from a great height, the grotesquely foreshortened figures still prancing in perfect rhythm even from this inhuman angle.

There was applause from an invisible audience. Then someone came out and did a dance with lighted torches that streamed long, weaving ribbons of fire among clouds of what looked like cotton wool but was most probably asbestos. Then a company in gorgeous pseudo-period costumes postured its way through the new singing ballet form of dance, roughly following a plot which had been announced as *Les Sylphides*, but had little in common with it. Afterward the precision dancers came on again, solemn and charming as performing dolls.

Maltzer began to show signs of dangerous tension as act succeeded act. Deirdre's was to be the last, of course. It seemed very long indeed before a face in close-up blotted out the stage, and a master of ceremonies with features like an amiable marionette's announced a very special number as the finale. His voice was almost cracking with excitement—perhaps he, too, had not been told until a moment before what lay in store for the audience.

Neither of the listening men heard what it was he said, but both were conscious of a certain indefinable excitement rising among the audience, murmurs and rustlings and a mounting anticipation as if time had run backward here and knowledge of the great surprise had already broken upon them.

Then the golden curtains appeared again. They quivered and swept apart on long upward arcs, and between them the stage was full of a shimmering golden haze. It was, Harris realized in a moment, simply a series of gauze curtains, but the effect was one of strange and wonderful anticipation, as if something very splendid must be hidden in the haze. The world might have looked like this on the first morning of creation, before heaven and earth took form in the mind of God. It was a singularly fortunate choice of stage set in its symbolism, though Harris wondered how much necessity had figured in its selection, for there could not have been much time to prepare an elaborate set.

The audience sat perfectly silent, and the air was tense. This was no ordinary pause before an act. No one had been told, surely, and yet they seemed to guess—

The shimmering haze trembled and began to thin, veil by veil. Beyond was darkness, and what looked like a row of shining pillars set in a balustrade that began gradually to take shape as the haze drew back in shining folds. Now they could see that the balustrade curved up from left and right to the head of a sweep of stairs. Stage and stairs were carpeted in black velvet; black velvet draperies hung just ajar behind the balcony, with a glimpse of dark sky beyond them trembling with dim synthetic stars.

The last curtain of golden gauze withdrew. The stage was empty. Or it seemed empty. But even through the aerial distances between this screen and the place it mirrored, Harris thought that the audience was not waiting for the performer to come on from the wings. There was no rustling, no coughing, no sense of impatience. A presence upon the stage was in command from the first drawing of the curtains; it filled the theater with its calm domination. It gauged its timing, holding the audience as a conductor with lifted baton gathers and holds the eyes of his orchestra.

For a moment everything was motionless upon the stage. Then, at the head of the stairs, where the two curves of the pillared balustrade swept together, a figure stirred.

Until that moment she had seemed another shining column in the row. Now she swayed deliberately, light catching and winking and running molten along her limbs and her robe of metal mesh. She swayed just enough to show that she was there. Then, with every eye upon her, she stood quietly to let them look their fill. The screen did not swoop to a close-up upon her. Her enigma remained inviolate and the television watchers saw her no more clearly than the audience in the theater.

Many must have thought her at first some wonderfully animate robot, hung perhaps from wires invisible against the velvet, for certainly she was no woman dressed in metal —her proportions were too thin and fine for that. And perhaps the impression of robotism was what she meant to convey at first. She stood quiet, swaying just a little, a masked and inscrutable figure, faceless, very slender in her robe that hung in folds as pure as a Grecian chlamys, though she did not look Grecian at all. In the visored golden helmet and the robe of mail that odd likeness to knighthood was there again, with its implications of medieval richness behind the simple lines. Except that in her exquisite slimness she called to mind no human figure in armor, not even the comparative delicacy of a St. Joan. It was the chivalry and delicacy of some other world implicit in her outlines.

A breath of surprise had rippled over the audience when she moved. Now they were tensely silent again, waiting. And the tension, the au-

ticipation, was far deeper than the surface importance of the scene could ever have evoked. Even those who thought her a manikin seemed to feel the forerunning of greater revelations.

Now she swayed and came slowly down the steps, moving with a suppleness just a little better than human. The swaying strengthened. By the time she reached the stage floor she was dancing. But it was no dance that any human creature could ever have performed. The long, slow, languorous rhythms of her body would have been impossible to a figure hinged at its joints as human figures hinge. (Harris remembered incredulously that he had feared once to find her jointed like a mechanical robot. But it was humanity that seemed, by contrast, jointed and mechanical now.)

The languor and the rhythm of her patterns looked impromptu, as all good dances should, but Harris knew what hours of composition and rehearsal must lie behind it, what laborious graving into her brain of strange new pathways, the first to replace the old ones and govern the mastery of metal limbs.

To and fro over the velvet carpet, against the velvet background, she wove the intricacies of her serpentine dance, leisurely and yet with such hypnotic effect that the air seemed full of looping rhythms, as if her long, tapering limbs had left their own replicas hanging upon the air and fading only slowly as she moved away. In her mind, Harris knew, the stage was a whole, a background to be filled in completely with the measured patterns of her dance, and she seemed almost to project that completed pattern to her audience so that they saw her everywhere at once, her golden rhythms fading upon the air long after she had gone.

Now there was music, looping and hanging in echoes after her like the shining festoons she wove with her body. But it was no orchestral music. She was humming, deep and sweet and wordlessly, as she glided her easy, intricate path about the stage. And the volume of the music was amazing. It seemed to fill the theater, and it was not amplified by hidden loudspeakers. You could tell that. Somehow, until you heard the music she made, you had never realized before the subtle distortions that amplification puts into music. This was utterly pure and true as perhaps no ear in all her audience had ever heard music before.

While she danced the audience did not seem to breathe. Perhaps they were beginning already to suspect who and what it was that moved before them without any fanfare of the publicity they had been half-expecting for weeks now. And yet, without the publicity, it was not easy to believe the dancer they watched was not some cunningly motivated manikin swinging on unseen wires about the stage.

Nothing she had done yet had been human. The dance was no dance a human being could have performed. The music she hummed came from a throat without vocal chords. But now the long, slow

rhythms were drawing to their close, the pattern tightening in to a finale. And she ended as inhumanly as she had danced, willing them not to interrupt her with applause, dominating them now as she had always done. For her implication here was that a machine might have performed the dance, and a machine expects no applause. If they thought unseen operators had put her through those wonderful paces, they would wait for the operators to appear for their bows. But the audience was obedient. It sat silently, waiting for what came next. But its silence was tense and breathless.

The dance ended as it had begun. Slowly, almost carelessly, she swung up the velvet stairs, moving with rhythms as perfect as her music. But when she reached the head of the stairs she turned to face her audience, and for a moment stood motionless, like a creature of metal, without volition, the hands of the operator slack upon its strings.

Then, startlingly, she laughed.

It was lovely laughter, low and sweet and full-throated. She threw her head back and let her body sway and her shoulders shake, and the laughter, like the music, filled the theater, gaining volume from the great hollow of the roof and sounding in the ears of every listener, not loud, but as intimately as if each sat alone with the woman who laughed.

And she was a woman now. Humanity had dropped over her like a tangible garment. No one who had ever heard that laughter before could mistake it here. But before the reality of who she was had quite time to dawn upon her listeners she let the laughter deepen into music, as no human voice could have done. She was humming a familiar refrain close in the ear of every hearer. And the humming in turn swung into words. She sang in her clear, light, lovely voice:

"The yellow rose of Eden, is blooming in my heart—"

It was Deirdre's song. She had sung it first upon the airways a month before the theater fire that had consumed her. It was a commonplace little melody, simple enough to take first place in the fancy of a nation that had always liked its songs simple. But it had a certain sincerity too, and no taint of the vulgarity of tune and rhythm that foredooms so many popular songs to oblivion after their novelty fades.

No one else was ever able to sing it quite as Deirdre did. It had been identified with her so closely that though for awhile after her accident singers tried to make it a memorial for her, they failed so conspicuously to give it her unmistakable flair that the song died from their sheer inability to sing it. No one ever hummed the tune without thinking of her and the pleasant, nostalgic sadness of something lovely and lost.

But it was not a sad song now. If anyone had doubted whose brain and ego motivated this shining metal

suppleness, they could doubt no longer. For the voice was Deirdre, and the song. And the lovely, poised grace of her mannerisms that make up recognition as certainly as sight of a familiar face.

She had not finished the first line of her song before the audience knew her.

And they did not let her finish. The accolade of their interruption was a tribute more eloquent than polite waiting could ever have been. First a breath of incredulity rippled over the theater, and a long, sighing gasp that reminded Harris irrelevantly as he listened to the gasp which still goes up from matinee audiences at the first glimpse of the fabulous Valentino, so many generations dead. But this gasp did not sigh itself away and vanish. Tremendous tension lay behind it, and the rising tide of excitement rippled up in little murmurs and spatterings of applause that ran together into one overwhelming roar. It shook the theater. The television screen trembled and blurred a little to the volume of that transmitted applause.

Silenced before it, Deirdre stood gesturing on the stage, bowing and bowing as the noise rolled up about her, shaking perceptibly with the triumph of her own emotion.

Harris had an intolerable feeling that she was smiling radiantly and that the tears were pouring down her cheeks. He even thought, just as Maltzer leaned forward to switch off the screen, that she was blowing kisses over the audience in the time-honored gesture of the grateful actress, her golden arms shining as she scattered kisses abroad from the featureless helmet, the face that had no mouth.

"Well?" Harris said, not without triumph.

Maltzer shook his head jerkily, the glasses unsteady on his nose so that the blurred eyes behind them seemed to shift.

"Of course they applauded, you fool," he said in a savage voice. "I might have known they would under this set-up. It doesn't prove anything. Oh, she was smart to surprise them—I admit that. But they were applauding themselves as much as her. Excitement, gratitude for letting them in on a historic performance, mass hysteria—*you* know. It's from now on the test will come, and this hasn't helped any to prepare her for it. Morbid curiosity when the news gets out—people laughing when she forgets she isn't human. And they will, you know. There are always those who will. And the novelty wearing off. The slow draining away of humanity for lack of contact with any human stimuli any more—"

Harris remembered suddenly and reluctantly the moment that afternoon which he had shunted aside mentally, to consider later. The sense of something unfamiliar beneath the surface of Deirdre's speech. Was Maltzer right? Was the drainage already at work? Or was there something deeper than this obvious answer to the question? Certainly she had been through experiences too terrible for

ordinary people to comprehend. Scars might still remain. Or, with her body, had she put on a strange, metallic something of the mind, that spoke to no sense which human minds could answer?

For a few minutes neither of them spoke. Then Maltzer rose abruptly and stood looking down at Harris with an abstract scowl.

"I wish you'd go now," he said.

Harris glanced up at him, startled. Maltzer began to pace again, his steps quick and uneven. Over his shoulder he said,

"I've made up my mind, Harris. I've got to put a stop to this."

Harris rose. "Listen," he said. "Tell me one thing. What makes you so certain you're right? Can you deny that most of it's speculation—hearsay evidence? Remember, I talked to Deirdre, and she was just as sure as you are in the opposite direction. Have you any real reason for what you think?"

Maltzer took his glasses off and rubbed his nose carefully, taking a long time about it. He seemed reluctant to answer. But when he did, at last, there was a confidence in his voice Harris had not expected.

"I have a reason," he said. "But you won't believe it. Nobody would."

"Try me."

Maltzer shook his head. "Nobody *could* believe it. No two people were ever in quite the same relationship before as Deirdre and I have been. I helped her come back out of complete—oblivion. I knew her before she had voice or hearing. She was only a frantic mind when I first made contact with her, half insane with all that had happened and fear of what would happen next. In a very literal sense she was reborn out of that condition, and I had to guide her through every step of the way. I came to know her thoughts before she thought them. And once you've been that close to another mind, you don't lose the contact easily." He put the glasses back on and looked blurrily at Harris through the heavy lenses. "Deirdre is worried," he said. "I know it. You won't believe me, but I can—well, sense it. I tell you, I've been too close to her very mind itself to make any mistake. You don't see it, maybe. Maybe even she doesn't know it yet. But the worry's there. When I'm with her, I feel it. And I don't want it to come any nearer the surface of her mind than it's come already. I'm going to put a stop to this before it's too late."

Harris had no comment for that. It was too entirely outside his own experience. He said nothing for a moment. Then he asked simply, "How?"

"I'm not sure yet. I've got to decide before she comes back. And I want to see her alone."

"I think you're wrong," Harris told him quietly. "I think you're imagining things. I don't think you *can* stop her."

Maltzer gave him a slanted glance. "I can stop her," he said, in a curious voice. He went on quickly, "She has enough already—she's nearly human. She can live nor-

mally as other people live, without going back on the screen. Maybe this taste of it will be enough. I've got to convince her it is. If she retires now, she'll never guess how cruel her own audiences could be, and maybe that deep sense of—distress, uneasiness, whatever it is—won't come to the surface. It mustn't. She's too fragile to stand that." He slapped his hands together sharply. "I've got to stop her. For her own sake I've got to do it!" He swung round again to face Harris. "Will you go now?"

Never in his life had Harris wanted less to leave a place. Briefly he thought of saying simply, "No I won't." But he had to admit in his own mind that Maltzer was at least partly right. This was a matter between Deirdre and her creator, the culmination, perhaps, of that year's long intimacy so like marriage that this final trial for supremacy was a need he recognized.

He would not, he thought, forbid the showdown if he could. Perhaps the whole year had been building up to this one moment between them in which one or the other must prove himself victor. Neither was very well stable just now, after the long strain of the year past. It might very well be that the mental salvation of one or both hinged upon the outcome of the clash. But because each was so strongly motivated not by selfish concern but by solicitude for the other in this strange combat, Harris knew he must leave them to settle the thing alone.

He was in the street and hailing

a taxi before the full significance of something Maltzer had said came to him. *"I can stop her,"* he had declared, with an odd inflection in his voice.

Suddenly Harris felt cold. Maltzer had made her—of course he could stop her if he chose. Was there some key in that supple golden body that could immobilize it at its maker's will? Could she be imprisoned in the cage of her own body? No body before in all history, he thought, could have been designed more truly to be a prison for its mind than Deirdre's, if Maltzer chose to turn the key that locked her in. There must be many ways to do it. He could simply withhold whatever source of nourishment kept her brain alive, if that were the way he chose.

But Harris could not believe he would do it. The man wasn't insane. He would not defeat his own purpose. His determination rose from his solicitude for Deirdre; he would not even in the last extremity try to save her by imprisoning her in the jail of her own skull.

For a moment Harris hesitated on the curb, almost turning back. But what could he do? Even granting that Maltzer would resort to such tactics, self-defeating in their very nature, how could any man on earth prevent him if he did it subtly enough? But he never would. Harris knew he never would. He got into his cab slowly, frowning. He would see them both tomorrow.

He did not. Harris was swamped with excited calls about yesterday's performance, but the message he was awaiting did not come. The day went by very slowly. Toward evening he surrendered and called Maltzer's apartment.

It was Deirdre's face that answered, and for once he saw no remembered features superimposed upon the blankness of her helmet. Masked and faceless, she looked at him inscrutably.

"Is everything all right?" he asked, a little uncomfortable.

"Yes, of course," she said, and her voice was a bit metallic for the first time, as if she were thinking so deeply of some other matter that she did not trouble to pitch it properly. "I had a long talk with Maltzer last night, if that's what you mean. You know what he wants. But nothing's been decided yet."

Harris felt oddly rebuffed by the sudden realization of the metal of her. It was impossible to read anything from face or voice. Each had its mask.

"What are you going to do?" he asked.

"Exactly as I'd planned," she told him, without inflection.

Harris floundered a little. Then, with an effort at practicality, he said, "Do you want me to go to work on bookings, then?"

She shook the delicately modeled skull. "Not yet. You saw the reviews today, of course. They—*did* like me." It was an understatement, and for the first time a note of warmth sounded in her voice. But the preoccupation was still there, too. "I'd already planned to make them wait awhile after my first per-

formance," she went on. "A couple of weeks, anyhow. You remember that little farm of mine in Jersey, John? I'm going over today. I won't see anyone except the servants there. Not even Maltzer. Not even you. I've got a lot to think about. Maltzer has agreed to let everything go until we've both thought things over. He's taking a rest, too. I'll see you the moment I get back, John. Is that all right?"

She blanked out almost before he had time to nod and while the beginning of a stammered argument was still on his lips. He sat there staring at the screen.

The two weeks that went by before Maltzer called him again were the longest Harris had ever spent. He thought of many things in the interval. He believed he could sense in that last talk with Deirdre something of the inner unrest that Maltzer had spoken of—more an abstraction than a distress, but some thought had occupied her mind which she would not—or was it that she could not?—share even with her closest confidants. He even wondered whether, if her mind was as delicately poised as Maltzer feared, one would ever know whether or not it had slipped. There was so little evidence one way or the other in the unchanging outward form of her.

Most of all he wondered what two weeks in a new environment would do to her untried body and newly patterned brain. If Maltzer were right, then there might be some perceptible—drainage—by the time they met again. He tried not to think of that.

Maltzer televised him on the morning set for her return. He looked very bad. The rest must have been no rest at all. His face was almost a skull now, and the blurred eyes behind their lenses burned. But he seemed curiously at peace, in spite of his appearance. Harris thought he had reached some decision, but whatever it was had not stopped his hands from shaking or the nervous *tic* that drew his face sidewise into a grimace at intervals.

"Come over," he said briefly, without preamble. "She'll be here in half an hour." And he blanked out without waiting for an answer.

When Harris arrived, he was standing by the window looking down and steadying his trembling hands on the sill.

"I can't stop her," he said in a monotone, and again without preamble. Harris had the impression that for the two weeks his thoughts must have run over and over the same track, until any spoken word was simply a vocal interlude in the circling of his mind. "I couldn't do it. I even tried threats, but she knew I didn't mean them. There's only one way out, Harris." He glanced up briefly, hollow-eyed behind the lenses. "Never mind. I'll tell you later."

"Did you explain everything to her that you did to me?"

"Nearly all. I even taxed her with that . . . that sense of distress I *know* she feels. She denied it. She was lying. We both knew. It

was worse after the performance than before. When I saw her that night, I tell you I *knew*—she senses something wrong, but she won't admit it." He shrugged. "Well—"

Faintly in the silence they heard the humming of the elevator descending from the helicopter platform on the roof. Both men turned to the door.

She had not changed at all. Foolishly, Harris was a little surprised. Then he caught himself and remembered that she would never change—never, until she died. He himself might grow white-haired and senile; she would move before him then as she moved now, supple, golden, enigmatic.

Still, he thought she caught her breath a little when she saw Maltzer and the depths of his swift degeneration. She had no breath to catch, but her voice was shaken as she greeted them.

"I'm glad you're both here," she said, a slight hesitation in her speech. "It's a wonderful day outside. Jersey was glorious. I'd forgotten how lovely it is in summer. Was the sanitarium any good, Maltzer?"

He jerked his head irritably and did not answer. She went on talking in a light voice, skimming the surface, saying nothing important.

This time Harris saw her as he supposed her audiences would, eventually, when the surprise had worn off and the image of the living Deirdre faded from memory. She was all metal now, the Deirdre they would know from today on. And she was not less lovely. She was not even less human—yet. Her motion was a miracle of flexible grace, a pouring of suppleness along every limb. (From now on, Harris realized suddenly, it was her body and not her face that would have mobility to express emotion; she must act with her limbs and her lithe, robed torso.)

But there was something wrong. Harris sensed it almost tangibly in her inflections, her elusiveness, the way she fenced with words. This was what Maltzer had meant, this was what Harris himself had felt just before she left for the country. Only now it was strong—certain. Between them and the old Deirdre whose voice still spoke to them a veil of—detachment—had been drawn. Behind it she was in distress. Somehow, somewhere, she had made some discovery that affected her profoundly. And Harris was terribly afraid that he knew what the discovery must be. Maltzer was right.

He was still leaning against the window, staring out unseeingly over the vast panorama of New York, webbed with traffic bridges, winking with sunlit glass, its vertiginous distances plunging downward into the blue shadows of Earth-level. He said now, breaking into the light-voiced chatter,

"Are you all right, Deirdre?"

She laughed. It was lovely laughter. She moved lithely across the room, sunlight glinting on her musical mailed robe, and stooped to a cigarette box on a table. Her fingers were deft.

"Have one?" she said, and carried the box to Maltzer. He let her put the brown cylinder between his lips and hold a light to it, but he did not seem to be noticing what he did. She replaced the box and then crossed to a mirror on the far wall and began experimenting with a series of gliding ripples that wove patterns of pale gold in the glass.

"Of course I'm all right," she said.

"You're lying."

Deirdre did not turn. She was watching him in the mirror, but the ripple of her motion went on slowly, languorously, undisturbed.

"No," she told them both.

Maltzer drew deeply on his cigarette. Then with a hard pull he unsealed the window and tossed the smoking stub far out over the gulfs below. He said,

"You can't deceive me, Deirdre." His voice, suddenly, was quite calm. "I created you, my dear. I know. I've sensed that uneasiness in you growing and growing for a long while now. It's much stronger today than it was two weeks ago. Something happened to you in the country. I don't know what it was, but you've changed. Will you admit to yourself what it is, Deirdre? Have you realized yet that you must not go back on the screen?"

"Why, no," said Deirdre, still not looking at him except obliquely, in the glass. Her gestures were slower now, weaving lazy patterns in the air. "No, I haven't changed my mind."

She was all metal—outwardly. She was taking unfair advantage of her own metal-hood. She had withdrawn far within, behind the mask of her voice and her facelessness. Even her body, whose involuntary motions might have betrayed what she was feeling, in the only way she could be subject to betrayal now, she was putting through ritual motions that disguised it completely. As long as these looping, weaving patterns occupied her, no one had any way of guessing even from her motion what went on in the hidden brain inside her helmet.

Harris was struck suddenly and for the first time with the completeness of her withdrawal. When he had seen her last in this apartment she had been wholly Deirdre, not masked at all, overflowing the metal with the warmth and ardor of the woman he had known so well. Since then—since the performance on the stage—he had not seen the familiar Deirdre again. Passionately he wondered why. Had she begun to suspect even in her moment of triumph what a fickle master an audience could be? Had she caught, perhaps, the sound of whispers and laughter among some small portion of her watchers, though the great majority praised her?

Or was Maltzer right? Perhaps Harris' first interview with her had been the last bright burning of the lost Deirdre, animated by excitement and the pleasure of meeting after so long a time, animation summoned up in a last strong effort to convince him. Now she was gone, but whether in self-protection against the possible cruelties of human beings, or whether in withdrawal to metal-hood, he could not

guess. Humanity might be draining out of her fast, and the brassy taint of metal permeating the brain it housed.

Maltzer laid his trembling hand on the edge of the opened window and looked out. He said in a deepened voice, the querulous note gone for the first time,

"I've made a terrible mistake, Deirdre. I've done you irreparable harm." He paused a moment, but Deirdre said nothing. Harris dared not speak. In a moment Maltzer went on. "I've made you vulnerable, and given you no weapons to fight your enemies with. And the human race is your enemy, my dear, whether you admit it now or later. I think you know that. I think it's why you're so silent. I think you must have suspected it on the stage two weeks ago, and verified it in Jersey while you were gone. They're going to hate you, after awhile, because you are still beautiful, and they're going to persecute you because you are different—and helpless. Once the novelty wears off, my dear, your audience will be simply a mob."

He was not looking at her. He had bent forward a little, looking out the window and down. His hair stirred in the wind that blew very strongly up this high, and whined thinly around the open edge of the glass.

"I meant what I did for you," he said, "to be for everyone who meets with accidents that might have ruined them. I should have known my gift would mean worse ruin

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than any mutilation could be. I know now that there's only one legitimate way a human being can create life. When he tries another way, as I did, he has a lesson to learn. Remember the lesson of the student Frankenstein? He learned, too. In a way, he was lucky—the way he learned. He didn't have to watch what happened afterward. Maybe he wouldn't have had the courage—I know I haven't."

Harris found himself standing without remembering that he rose. He knew suddenly what was about to happen. He understood Maltzer's air of resolution, his new, unnatural calm. He knew, even, why Maltzer had asked him here today, so that Deirdre might not be left alone. For he remembered that Frankenstein, too, had paid with his life for the unlawful creation of life.

Maltzer was leaning head and shoulders from the window now, looking down with almost hypnotized fascination. His voice came back to them remotely in the breeze, as if a barrier already lay between them.

Deirdre had not moved. Her expressionless mask, in the mirror, watched him calmly. She *must* have understood. Yet she gave no sigh, except that the weaving of her arms had almost stopped now, she moved so slowly. Like a dance seen in a nightmare, under water.

It was impossible, of course, for her to express any emotion. The fact that her face showed none now should not, in fairness, be held against her. But she watched so wholly without feeling— Neither of them moved toward the window. A false step, now, might send him over. They were quiet, listening to his voice.

"We who bring life into the world unlawfully," said Maltzer, almost thoughtfully, "must make room for it by withdrawing our own. That seems to be an inflexible rule. It works automatically. The thing we create makes living unbearable. No, it's nothing you can help, my dear. I've asked you to do something I created you incapable of doing. I made you to perform a function, and I've been asking you to forego the one thing you were made to do. I believe that if you do it, it will destroy you, but the whole guilt is mine, not yours. I'm not even asking you to give up the screen, any more. I know you can't, and live. But I can't live and watch you. I put all my skill and all my love in one final masterpiece, and I can't bear to watch it destroyed. I can't live and watch you do only what I made you to do, and ruin yourself because you must do it.

"But before I go, I have to make sure you understand." He leaned a little farther, looking down, and his voice grew more remote as the glass came between them. He was saying almost unbearable things now, but very distantly, in a cool, passionless tone filtered through wind and glass, and with the distant humming of the city mingled with it, so that the words were curiously robbed of poignancy. "I can be a coward," he said, "and escape the consequences of what I've done,

but I can't go and leave you—not understanding. It would be even worse than the thought of your failure to think of you bewildered and confused when the mob turns on you. What I'm telling you, my dear, won't be any real news—I think you sense it already, though you may not admit it to yourself. We've been too close to lie to each other, Deirdre—I know when you aren't telling the truth. I know the distress that's been growing in your mind. You are not wholly human, my dear. I think you know that. In so many ways, in spite of all I could do, you must always be less than human. You've lost the senses of perception that kept you in touch with humanity. Sight and hearing are all that remain, and sight, as I've said before, was the last and coldest of the senses to develop. And you're so delicately poised on a sort of thin edge of reason. You're only a clear, glowing mind animating a metal body, like a candle flame in a glass. And as precariously vulnerable to the wind."

He paused. "Try not to let them ruin you completely," he said after a while. "When they turn against you, when they find out you're more helpless than they— I wish I could have made you stronger, Deirdre. But I couldn't. I had too much skill for your good and mine, but not quite enough skill for that."

He was silent again, briefly, looking down. He was balanced precariously now, more than halfway over the sill and supported only by one hand on the glass. Harris watched with an agonized uncertainty, not sure whether a sudden leap might catch him in time or send him over. Deirdre was still weaving her golden patterns, slowly and unchangingly, watching the mirror and its reflection, her face and masked eyes enigmatic.

"I wish one thing, though," Maltzer said in his remote voice. "I wish—before I finish—that you'd tell me the truth, Deirdre. I'd be happier if I were sure I'd—reached you. Do you understand what I've said? Do you believe me? Because if you don't, then I know you're lost beyond all hope. If you'll admit your own doubt—and I know you do doubt—I can think there may be a chance for you after all. Were you lying to me, Deirdre? Do you know how . . . how wrong I've made you?"

There was silence. Then very softly, a breath of sound, Deirdre answered. The voice seemed to hang in midair, because she had no lips to move and localize it for the imagination.

"Will you listen, Maltzer?" she asked.

"I'll wait," he said. "Go on. Yes or no?"

Slowly she let her arms drop to her sides. Very smoothly and quietly she turned from the mirror and faced him. She swayed a little, making her metal robe ring.

"I'll answer you," she said. "But I don't think I'll answer that. Not with yes or no, anyhow. I'm going to walk a little, Maltzer. I have something to tell you, and I can't

talk standing still. Will you let me move about without—going over?"

He nodded distantly. "You can't interfere from that distance," he said. "But keep the distance. What do you want to say?"

She began to pace a little way up and down her end of the room, moving with liquid ease. The table with the cigarette box was in her way, and she pushed it aside carefully, watching Maltzer and making no swift motions to startle him.

"I'm not—well, sub-human," she said, a faint note of indignation in her voice. "I'll prove it in a minute, but I want to say something else first. You must promise to wait and listen. There's a flaw in your argument, and I resent it. I'm not a Frankenstein monster made out of dead flesh. I'm myself—alive. You didn't create my life, you only preserved it. I'm not a robot, with compulsions built into me that I have to obey. I'm free-willed and independent, and, Maltzzer—I'm human."

Harris had relaxed a little. She knew what she was doing. He had no idea what she planned, but he was willing to wait now. She was not the indifferent automaton he had thought. He watched her come to the table again in a lap of her pacing, and stoop over it, her eyeless mask turned to Maltzer to make sure a variation of her movement did not startle him.

"I'm human," she repeated, her voice humming faintly and very sweetly. "Do you think I'm not?" she asked, straightening and facing them both. And then suddenly, almost overwhelmingly, the warmth and the old ardent charm was radiant all around her. She was robot no longer, enigmatic no longer. Harris could see as clearly as in their first meeting the remembered flesh still gracious and beautiful as her voice evoked his memory. She stood swaying a little, as she had always swayed, her head on one side, and she was chuckling at them both. It was such a soft and lovely sound, so warmly familiar.

"Of course I'm myself," she told them, and as the words sounded in their ears neither of them could doubt it. There was hypnosis in her voice. She turned away and began to pace again, and so powerful was the human personality which she had called up about her that it beat out at them in deep pulses, as if her body were a furnace to send out those comforting waves of warmth. "I have handicaps, I know," she said. "But my audiences will never know. I won't let them know. I think you'll believe me, both of you, when I say I could play Juliet just as I am now, with a cast of ordinary people, and make the world accept it. Do you think I could, John? Maltzer, don't you believe I could?"

She paused at the far end of her pacing path and turned to face them, and they both stared at her without speaking. To Harris she was the Deirdre he had always known, pale gold, exquisitely graceful in remembered postures, the inner radiance of her shining through metal as brilliantly as it had ever shone through flesh. He did not

wonder, now, if it were real. Later he would think again that it might be only a disguise, something like a garment she had put off with her lost body, to wear again only when she chose. Now the spell of her compelling charm was too strong for wonder. He watched, convinced for the moment that she was all she seemed to be. She could play Juliet if she said she could. She could sway a whole audience as easily as she swayed himself. Indeed, there was something about her just now more convincingly human than anything he had noticed before. He realized that in a split second of awareness before he saw what it was.

She was looking at Maltzer. He, too, watched, spellbound in spite of himself, not dissenting. She glanced from one to the other. Then she put back her head and laughter came welling and choking from her in a great, full-throated tide. She shook in the strength of it. Harris could almost see her round throat pulsing with the sweet low-pitched waves of laughter that were shaking her. Honest mirth, with a little derision in it.

Then she lifted one arm and tossed her cigarette into the empty fireplace.

Harris choked, and his mind went blank for one moment of blind denial. He had not sat here watching a robot smoke and accepting it as normal. He could not! And yet he had. That had been the final touch of conviction which swayed his hypnotized mind into accepting

her humanity. And she had done it so deftly, so naturally, wearing her radiant humanity with such rightness, that his watching mind had not even questioned what she did.

He glanced at Maltzer. The man was still halfway over the window ledge, but through the opening of the window he, too, was staring in stupefied disbelief and Harris knew they had shared the same delusion.

Deirdre was still shaking a little with laughter. "Well," she demanded, the rich chuckling making her voice quiver, "am I all robot, after all?"

Harris opened his mouth to speak, but he did not utter a word. This was not his show. The byplay lay wholly between Deirdre and Maltzer; he must not interfere. He turned his head to the window and waited.

And Maltzer for a moment seemed shaken in his conviction.

"You . . . you *are* an actress," he admitted slowly. "But I . . . I'm not convinced I'm wrong. I think—" He paused. The querulous note was in his voice again, and he seemed racked once more by the old doubts and dismay. Then Harris saw him stiffen. He saw the resolution come back, and understood why it had come. Maltzer had gone too far already upon the cold and lonely path he had chosen to turn back, even for stronger evidence than this. He had reached his conclusions only after mental turmoil too terrible to face again. Safety and peace lay in the course he had steeled himself to follow. He was too tired, too exhausted by months of conflict, to retrace his path and begin all over. Harris could see him groping for a way out, and in a moment he saw him find it.

"That was a trick," he said hollowly. "Maybe you could play it on a larger audience, too. Maybe you have more tricks to use. I might be wrong. But Deirdre"—his voice grew urgent—"you haven't answered the one thing I've got to know. You can't answer it. You *do* feel—dismay. You've learned your own inadequacy, however well you can hide it from us—even from us. I *know*. Can you deny that, Deirdre?"

She was not laughing now. She let her arms fall, and the flexible golden body seemed to droop a little all over, as if the brain that a moment before had been sending out strong, sure waves of confidence had slackened its power, and the intangible muscles of her limbs slackened with it. Some of the glowing humanity began to fade. It receded within her and was gone, as if the fire in the furnace of her body were sinking and cooling.

"Maltzer," she said uncertainly, "I can't answer that—yet. I can't—"

And then, while they waited in anxiety for her to finish the sentence, she *blazed*. She ceased to be a figure in stasis—she *blazed*.

It was something no eyes could watch and translate into terms the brain could follow; her motion was too swift. Maltzer in the window was a whole long room-length away. He had thought himself safe at such a distance, knowing no normal human being could reach him before he moved. But Deirdre was neither normal nor human.

In the same instant she stood drooping by the mirror she was simultaneously at Maltzer's side. Her motion negated time and destroyed space. And as a glowing cigarette tip in the dark describes closed circles before the eye when the holder moves it swiftly, so Deirdre blazed in one continuous flash of golden motion across the room.

But curiously, she was not blurred. Harris, watching, felt his mind go blank again, but less in surprise than because no normal eyes and brain could perceive what it was he looked at.

(In that moment of intolerable suspense his complex human brain paused suddenly, annihilating time in its own way, and withdrew to a

Perhaps I'm one war older than you are!

Believe me, after the last war I saw what happened. Will you let me give you some advice?

•

If you've got a job today—for your own sake, fellow, be smart! Think twice before you fight for a wage increase that might force prices up and land you behind the eight-ball in the end.

Salt away as much as you can out of your present wages. Put money in the bank, pay up your debts, buy more life insurance. Above all, put every extra penny you can lay your hands on into Uncle Sam's War Bonds and *hold* 'em!

Nobody knows what's coming when the Germans and the Japs are licked. Perhaps we'll have good times. Okay. You'll be sitting pretty. Perhaps we'll have bad times. Then they're sure to hit hardest on the guy with nothing saved.

The best thing you can do for your country right now is not to buy a thing you can get along without. That helps keep prices down, heads off inflation, helps to insure good times after the war.

And the best thing you can do for your own sake, brother, if there *should* be a depression ahead, is to get your finances organized on a sound basis of paid-up debts—and have a little money laid by to see you through!

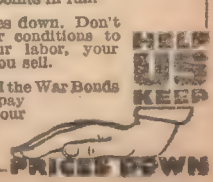
4 THINGS TO DO to keep prices down and help avoid another depression

1. Buy only what you really need.

2. When you buy, pay no more than ceiling price. Pay your ration points in full.

3. Keep your *own* prices down. Don't take advantage of war conditions to ask for more—for your labor, your services, or the goods you sell.

4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.



A United States war message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in cooperation with the Magazine Publishers of America.

cool corner of its own to analyze in a flashing second what it was he had just seen. The brain could do it timelessly; words are slow. But he knew he had watched a sort of tesseract of human motion, a parable of fourth-dimensional activity. A one-dimensional point, moved through space, creates a two-dimensional line, which in motion creates a three-dimensional cube. Theoretically the cube, in motion, would produce a fourth-dimensional figure. No human creature had ever seen a figure of three dimensions moved through space and time before—until this moment. She had not blurred; every motion she made was distinct, but not like moving figures on a strip of film. Not like anything that those who use our language had ever seen before, or created words to express. The mind saw, but without perceiving. Neither words nor thoughts could resolve what happened into terms for human brains. And perhaps she had not actually and literally moved through the fourth dimension. Perhaps—since Harris was able to see her—it had been almost and not quite that unimaginable thing. But it was close enough.

While to the slow mind's eye she was still standing at the far end of the room, she was already at Maltzer's side, her long, flexible fingers gentle but very firm upon his arms. She waited—

The room shimmered. There was sudden violent heat beating upon Harris' face. Then the air steadied again and Deirdre was saying softly, in a mournful whisper, "I'm sorry—I had to do it. I'm sorry—I didn't mean you to know—"

Time caught up with Harris. He saw it overtake Maltzer too, saw the man jerk convulsively away from the grasping hands, in a ludicrously futile effort to forestall what had already happened. Even thought was slow, compared with Deirdre's swiftness.

The sharp outward jerk was strong. It was strong enough to break the grasp of human hands and catapult Maltzer out and down into the swimming gulfs of New York. The mind leaped ahead to a logical conclusion and saw him twisting and turning and diminishing with dreadful rapidity to a tiny point of darkness that dropped away through sunlight toward the shadows near the earth. The mind even conjured up a shrill, thin cry that plummeted away with the falling body and hung behind it in the shaken air.

But the mind was reckoning on human factors.

Very gently and smoothly Deirdre lifted Maltzer from the window sill and with effortless ease carried him well back into the safety of the room. She set him down before a sofa and her golden fingers unwrapped themselves from his arms slowly, so that he could regain control of his own body before she released him.

He sank to the sofa without a word. Nobody spoke for an unmeasurable length of time. Harris could not. Deirdre waited pa-

tiently. It was Maltzer who regained speech first, and it came back on the old track, as if his mind had not yet relinquished the rut it had worn so deep.

"All right," he said breathlessly. "All right, you can stop me this time. But I know, you see. I know! You can't hide your feeling from me, Deirdre. I know the trouble you feel. And next time—next time I won't wait to talk!"

Deirdre made the sound of a sigh. She had no lungs to expel the breath she was imitating, but it was hard to realize that. It was hard to understand why she was not panting heavily from the terrible exertion of the past minutes; the mind knew why, but could not accept the reason. She was still too human.

"You still don't see," she said. "Think, Maltzer, think!"

There was a hassock beside the sofa. She sank upon it gracefully, clasping her robed knees. Her head tilted back to watch Maltzer's face. She saw only stunned stupidity on it now; he had passed through too much emotional storm to think at all.

"All right," she told him. "Listen—I'll admit it. You're right. I *am* unhappy. I do know what you said was true—but not for the reason you think. Humanity and I are far apart, and drawing farther. The gap will be hard to bridge. Do you hear me, Maltzer?"

Harris saw the tremendous effort that went into Maltzer's wakening. He saw the man pull his mind back into focus and sit up on the sofa with weary stiffness.

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"You . . . you do admit it, then?" he asked in a bewildered voice.

Deirdre shook her head sharply.

"Do you still think of me as delicate?" she demanded. "Do you know I carried you here at arm's length halfway across the room? Do you realize you weigh *nothing* to me? I could"—she glanced around the room and gestured with sudden, rather appalling violence—"tear this building down," she said quietly. "I could tear my way through these walls, I think. I've found no limit yet to the strength I can put forth if I try." She held up her golden hands and looked at them. "The metal would break, perhaps," she said reflectively, "but then, I have no feeling—"

Maltzer gasped, *"Deirdre—"*

She looked up with what must have been a smile. It sounded clearly in her voice. "Oh, I won't. I wouldn't have to do it with my hands, if I wanted. Look—listen!"

She put her head back and a deep, vibrating hum gathered and grew in what one still thought of as her throat. It deepened swiftly and the ears began to ring. It went deeper, and the furniture vibrated. The walls began almost imperceptibly to shake. The room was full and bursting with a sound that shook every atom upon its neighbor with a terrible, disrupting force.

The sound ceased. The humming died. Then Deirdre laughed and made another and quite differently pitched sound. It seemed to reach out like an arm in one straight direction—toward the window. The opened panel shook. Deirdre intensified her hum, and slowly, with imperceptible jolts that merged into smoothness, the window jarred itself shut.

"You see?" Deirdre said. "You see?"

But still Maltzer could only stare. Harris was staring too, his mind beginning slowly to accept what she implied. Both were too stunned to leap ahead to any conclusions yet.

Deirdre rose impatiently and began to pace again, in a ringing of metal robe and a twinkling of reflected lights. She was panther-like in her suppleness. They could see the power behind that lithe motion now; they no longer thought of her as helpless, but they were far still from grasping the truth.

"You were wrong about me, Maltzer," she said with an effort at patience in her voice. "But you were right too, in a way you didn't guess. I'm not afraid of humanity. I haven't anything to fear from them. Why"—her voice took on a tinge of contempt—"already I've set a fashion in women's clothing. By next week you won't see a woman on the street without a mask like mine, and every dress that isn't cut like a chlamys will be out of style. I'm not afraid of humanity! I won't lose touch with them unless I want to. I've learned a lot—I've learned too much already."

Her voice faded for a moment, and Harris had a quick and appalling vision of her experimenting in the solitude of her farm, testing the range of her voice, testing her eye-

sight—could she see microscopically and telescopically?—and was her hearing as abnormally flexible as her voice?

"You were afraid I had lost feeling and scent and taste," she went on, still pacing with that powerful, tigerish tread. "Hearing and sight would not be enough, you think? But why do you think sight is the last of the senses? It may be the latest, Maltzer—Harris—*but why do you think it's the last?*"

She may not have whispered that. Perhaps it was only their hearing that made it seem thin and distant, as the brain contracted and would not let the thought come through in its stunning entirety.

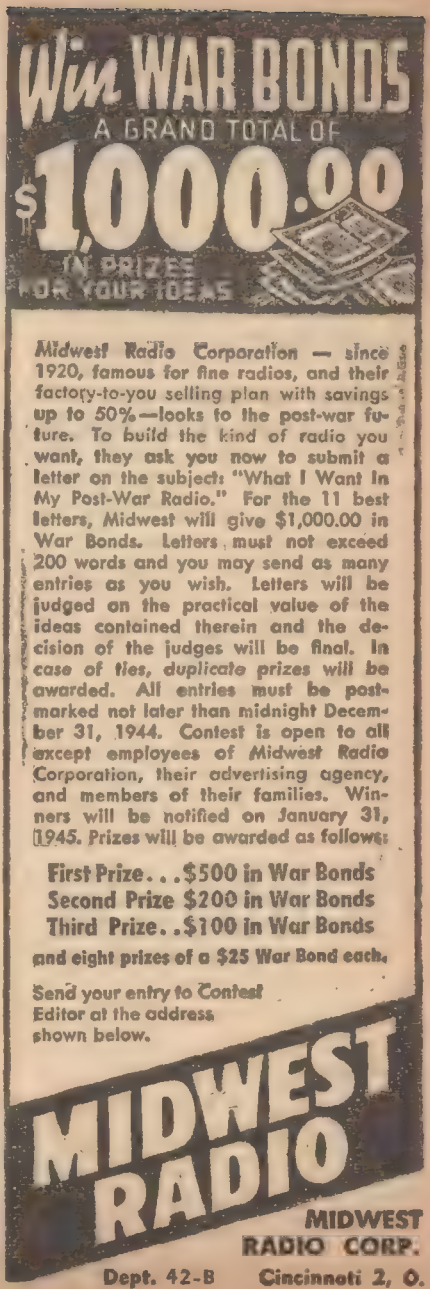
"No," Deirdre said, "I haven't lost contact with the human race. I never will, unless I want to. It's too easy . . . too easy."

She was watching her shining feet as she paced, and her masked face was averted. Sorrow sounded in her soft voice now.

"I didn't mean to let you know," she said. "I never would have, if this hadn't happened. But I couldn't let you go believing you'd failed. You made a perfect machine, Maltzer. More perfect than you knew."

"But Deirdre—" breathed Maltzer, his eyes fascinated and still incredulous upon her, "but Deirdre, if we did succeed—what's wrong? I can feel it now—I've felt it all along. You're so unhappy—you still are. Why, Deirdre?"

She lifted her head and looked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at him, eyelessly, but with a piercing stare.

"Why are you so sure of that?" she asked gently.

"You think I could be mistaken, knowing you as I do? But I'm not Frankenstein . . . you say my creation's flawless. Then what—"

"Could you ever duplicate this body?" she asked.

Maltzer glanced down at his shaking hands. "I don't know. I doubt it. I—"

"Could anyone else?"

He was silent. Deirdre answered for him. "I don't believe anyone could. I think I was an accident. A sort of mutation halfway between flesh and metal. Something accidental and . . . and unnatural, turning off on a wrong course of evolution that never reaches a dead end. Another brain in a body like this might die or go mad, as you thought I would. The synapses are too delicate. You were—call it lucky—with me. From what I know now, I don't think a . . . a baroque like me could happen again." She paused a moment. "What you did was kindle the fire for the Phoenix, in a way. And the Phoenix rises perfect and renewed from its own ashes. Do you remember why it had to reproduce itself that way?"

Maltzer shook his head.

"I'll tell you," she said. "It was because there was only one Phoenix. Only one in the whole world."

They looked at each other in silence. Then Deirdre shrugged a little.

"He always came out of the fire perfect, of course. I'm not weak, Maltzer. You needn't let that thought bother you any more. I'm not vulnerable and helpless. I'm not sub-human." She laughed dryly. "I suppose," she said, "that I'm—superhuman."

"But—not happy."

"I'm afraid. It isn't unhappiness, Maltzer—it's fear. I don't want to draw so far away from the human race. I wish I needn't. That's why I'm going back on the stage—to keep in touch with them while I can. But I wish there could be others like me. I'm . . . I'm lonely, Maltzer."

Silence again. Then Maltzer said, in a voice as distant as when he had spoken to them through glass, over gulfs as deep as oblivion,

"Then I am Frankenstein, after all."

"Perhaps you are," Deirdre said very softly. "I don't know. Perhaps you are."

She turned away and moved smoothly, powerfully, down the room to the window. Now that Harris knew, he could almost hear the sheer power purring along her limbs as she walked. She leaned the golden forehead against the glass—it clinked faintly, with a musical sound—and looked down into the depths Maltzer had hung above. Her voice was reflective as she looked into those dizzy spaces which had offered oblivion to her creator.

"There's one limit I can think of," she said, almost inaudibly. "Only one. My brain will wear

out in another forty years or so. Between now and then I'll learn . . . I'll change . . . I'll know more than I can guess today. I'll change—That's frightening. I don't like to think about that." She laid a curved golden hand on the latch and pushed the window open a little, very easily. Wind whined around its edge. "I could put a stop to it now, if I wanted," she said. "If I wanted.—But I can't, really. There's so much still untried. My brain's human, and no human brain could leave such possibilities untested. I wonder, though . . . I do wonder—"

Her voice was soft and familiar in Harris' ears, the voice Deirdre had spoken and sung with, sweetly enough to enchant a world. But as preoccupation came over her a certain flatness crept into the sound. When she was not listening to her own voice, it did not keep quite to the pitch of trueness. It sounded as if she spoke in a room of brass, and echoes from the walls resounded in the tones that spoke there.

"I wonder," she repeated, the distant taint of metal already in her voice.

THE END.

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SPACESHIP'S VIEW!

(*Continued from page 103*)

a very marked parallax, so that, standing behind the homemade moon, one-half, or one-quarter of the lens will be visible, but not all. That plays ruinous tricks with detail on or near the edge of the moon. At the southern edge of the picture on page 103—the top edge—there is a marked distortion of the lunar features due to that effect.

We're disappointed—but we do feel these shots are extremely interesting. And—they may inspire someone, more favorably located, to go and do better. In various parts of the United States there are large, white-painted spherical gas-holders, used for storing natural gas under considerable pressure. There may be other large, white spheres or hemispheres. The lunar slides needed for the projector can be obtained from Mount Wilson Observatory or other major astronomical observatories. A glib tongue, a convincing air, and—possibly—this article may help to get permission to do the job some dark and moonless night. It will take some long exposures, some real ingenuity in solving problems of projector power-supply, and a large camera, if the thing is to be done right. A sphere would be far handier to use as the projection screen; it may be darned near as difficult as building a spaceship in the first place to hang a camera somewhere to the northwest of a one-hundred-foot hemisphere. But it would be simple to put the slide in at a peculiar angle to re-orient the "moon" with respect to your grounded tripod.

There is one other form of distortion that is inherent in this process, and nothing can be done about it for the next fifteen years or so. That is the—call it "opacity shadow." Our camera spaceship is in a position to see the other side of the Moon—but there is, obviously, nothing in the projected image there. The original taking camera was not in a position to see. The same phenomena, on a smaller scale, applies to crater walls, and similar objects.

Overcoming that opacity-shadow effect, plus the deleterious effect of the Earth's atmosphere in making the original telescopic shots, are things that no amount of photographic ingenuity here on Earth can overcome. They can be repaired only by waiting the necessary fifteen years or so till the first ships capable of circling the Moon are built. Then we'll see the unseeable craters.

In the meantime, we'll have to try photographic spaceships.

Any photographs so obtained will be of great interest. Dr. R. S. Richardson originally suggested this project to me, and helped me with it. Any help I can render, based on what I know won't work, will be gladly offered.

Anyone interested in 8 x 10 glossy prints of these experimental shots published here may obtain them for 50c each, by writing this magazine.

THE END.

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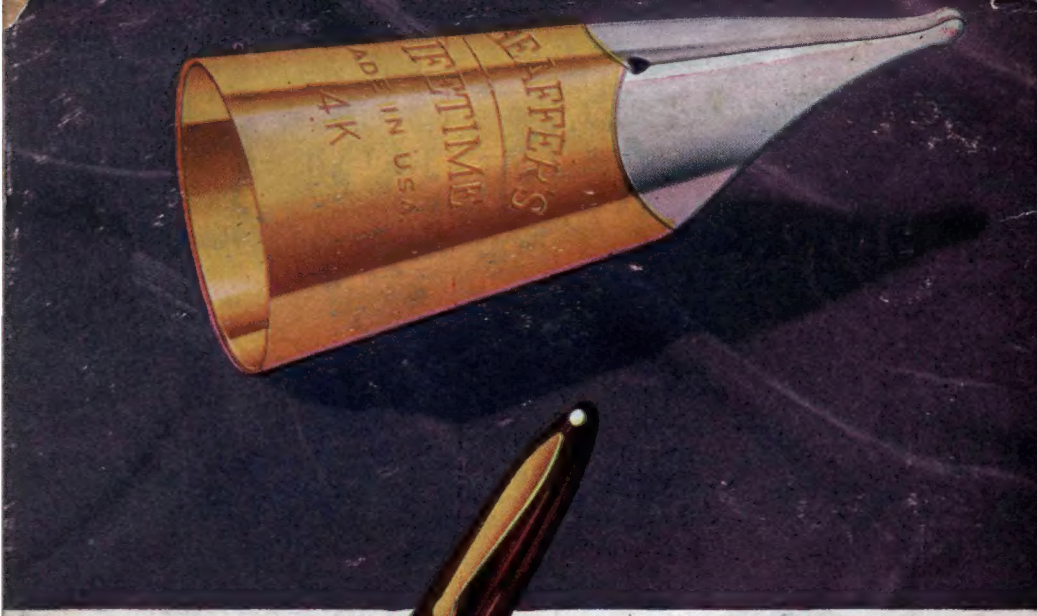

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Greater worth—not alone in the use of *more* than twice as much gold as other pens selling at the same price—but in *how* and *why* more gold is used! This 14 karat gold Sheath Point, stronger because it is a cylinder, permits a *larger diameter* fluid feeding mechanism giving *safe* fluid control under all atmospheric conditions! W. A. Sheaffer Pen Company, Fort Madison, Iowa; Toronto, Ontario, Canada.

"TRIUMPH" *Lifetime** pen, with clip, $12.50; pencil, $5. "TRIUMPH TUCKAWAY" model, without clip, for men or women, carries safely *in all positions* in purse or pocket—pen, $12.50; pencil, $4. Other sets with 14K gold trim, $35 to $125

*All *Lifetime* pens, identified by the White Dot, are unconditionally guaranteed for the life of the first user except against loss and willful damage—when serviced, if complete pen is returned, subject only to insurance, postage, handling charge—35c if you send it to the factory yourself; slightly more if you request the dealer to do it for you.

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